

NENA

Standard Data Formats

For E9-1-1 Data Exchange & GIS Mapping

Abstract: This document sets forth NENA standard formats for Automatic Location Identification (ALI) data exchange between Service Providers and Data Base Management System Providers, a Geographic Information System (GIS) data model, and formats for data exchange between the ALI Database and PSAP Controller equipment.



NENA Standard Data Formats for E9-1-1 Data Exchange & GIS Mapping

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1 Executive Overview

This document sets forth NENA standard formats for Automatic Location Identification (ALI) data exchange between Service Providers and Data Base Management System Providers, a Geographic Information System (GIS) data model, and formats for data exchange between the ALI Database and PSAP Controller equipment. However, it should be noted that legacy E9-1-1 formats to a PSAP are highly configurable. The reason for revising this document is to add additional legacy Classes of Service (CoS), standardized use of Service Descriptions in the Customer Name/Service field, and specify the recommended CoS information in Section 18 and the recommended Service Descriptions in Section 19.

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Document Terminology

This section defines keywords, as they should be interpreted in NENA documents. The form of emphasis (UPPER CASE) shall be consistent and exclusive throughout the document. Any of these words used in lower case and not emphasized do not have special significance beyond normal usage.

1. **MUST, SHALL, REQUIRED:** These terms mean that the definition is a normative (absolute) requirement of the specification.
2. **MUST NOT:** This phrase, or the phrase "SHALL NOT", means that the definition is an absolute prohibition of the specification.
3. **SHOULD:** This word, or the adjective "RECOMMENDED", means that there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.
4. **SHOULD NOT:** This phrase, or the phrase "NOT RECOMMENDED" means that there may exist valid reasons in particular circumstances when the particular behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.
5. **MAY:** This word, or the adjective "OPTIONAL", means that an item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because the vendor feels that it enhances the product while another vendor may omit the same item. An implementation which does not include a particular option "must" be prepared to interoperate with another implementation which does include the option, though perhaps with reduced functionality. In the same vein an implementation which does include a particular option "must" be prepared to interoperate with another implementation which does not include the option (except, of course, for the feature the option provides.)

These definitions are based on IETF [RFC 2119](https://tools.ietf.org/html/rfc2119).

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Reason for Issue/Reissue

NENA reserves the right to modify this document. Upon revision, the reason(s) will be provided in this paragraph.

| Document Number | Approval Date | Reason For Issue/Reissue |
|-----------------|---------------|---|
| NENA 02-010 v1 | 06/15/1991 | Initial Document defined NENA Version 1 Data Exchange Format. The original Version 1 Data Exchange format was created to provide established formats for exchange of 9-1-1 data between Service Providers and the Data Base Management System Providers. The format was created in a fixed format with 232 characters available within the record format for ALI source data. |

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| NENA 02-010 v2 | 06/15/1993 | NENA Version 2 Data Exchange Format created. |
| NENA 02-010 v3 | 06/30/1998 | <p>Version 1 has been changed to reflect current terminology in format description fields.</p> <p>Version 2 has been changed to Version 2.1 to reflect new fields which reflect the "year 2000" date identification and definition of the Alternative Telephone Number "Alt #" field for the "ALT#" associated with Interim Number Portability, to identify the Function of Change indicators of "U"nlock and "M"igrate for Local Number Portability and to reflect current terminology in format description fields. This will be the last update to Version 2.</p> <p>Version 3 Data Exchange Formats were added June 1998 due to the difficulty in modifying Version 2 standards. Version 3.0 has been created to reflect data formats utilizing a "Tag Data" concept, which creates a variable length record dependent upon the data fields being utilized between Service Providers and Data Base Management System Providers. Version 3 formats include additional fields and updated field names to better reflect industry trends.</p> |
| NENA 02-010 v4 | 05/30/1999 | This standard has been created to merge and replace the original NENA 02-001 NENA Recommended Formats for Data Exchange and NENA 02-003 NENA Recommended Protocols for Data Exchange into a common document to facilitate ease of use based upon the user community. There has been no intentional change made to the existing standards. The original standards documents 02-001 and 02-003 will be removed from service. |
| NENA 02-010 v5 | 01/22/2002 | Version 3.0 formats were changed to Version 3.1 with the introduction of Version 4, and the need |

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| | | <p>to change existing labels and add new labels due to technology changes.`</p> <p>This standard has been updated with a Version 4 Data Exchange that is based on Version 3.1 tags with XML formatting. Version 3.1 and Version 4 tags are meant to be mirrors of each other with the only difference being the tag versus XML formatting. This document has also been updated with Version 1.0 of the GIS Data Model Format and Version 1.0 of the Format for Data Exchange between ALI Database and PSAP Controller Equipment.</p> <p>Version 4 Data Exchange Format is an industry standard XML data format. NENA XML (Extensible Markup Language) documents have been adapted from Standard Generalized Markup Language (SGML) by the World Wide Web Consortium. Version 4 Data Exchange Format was created to bring the NENA Data Exchange Format in line with industry standard implementation methods, to introduce versioning control and promote reusability of previous work. All existing NENA 4 information has been removed from this document and moved to an easily accessible area on the NENA web site. http://www.nena.org/xml_schemas/nena.htm.</p> |
| NENA 02-010 v6 | 11/09/2004 | <p>The NENA Version 4 XML Data Exchange Format has been revised to include:</p> <ul style="list-style-type: none"> • Industry standard tag naming conventions • A schema library document to define XML tag names and their respective data types • An XML schema document for use in validation of XML documents |



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| | | <ul style="list-style-type: none"> • A redesigned XML schema to promote the reusability of defined XML data structures. • A process that will allow changes to existing data definitions that will not require reprogramming of applications. • Establishment of Generation and Release control methods that promotes backward compatibility <p>The Data Provider ID (Company ID 2) field is used to carry the NENA Company ID of a PS/911data provider or a reseller. The NENA Reserved field has been reduced by 5 bytes to accommodate the Data Provider ID (Company ID 2) field. In addition the "Company ID" field that represents the "Company ID 1" field has been renamed to Access Infrastructure Provider ID and the definition clarified.</p> |
| NENA 02-010 v7 | 02/25/2006 | <p>Established new Classes of Service for VoIP. There have been 4 types of VoIP users identified:</p> <ol style="list-style-type: none"> 1. Fixed (static) - VoIP service sold as not having nomadic capability 2. Enterprise – Internet Protocol Private Branch Exchange (IP PBX), VoIP service sold as not having nomadic capability 3. Nomadic – VoIP service that has the capability to be moved 4. Mobile – example: like wireless, designed to operate from multiple locations <p>Seven new Class of Service have been identifies for VoIP. With the understanding that most VoIP providers do not have the capability of delivering the specific Class of Service at this time, a default Class of Service has been developed.</p> |



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| | | <p>V = VoIP Services default Class of Service. (preferably with VOIP being displayed at the PSAP)</p> <p>The other new Class of Service one byte characters are:</p> <ul style="list-style-type: none"> • C= VoIP Residential (preferably with VRES being displayed at the PSAP) • D= VoIP Business (preferably with VBUS being displayed at the PSAP) • E = VoIP Coin/Pay Phone (preferably with VPAY being displayed at the PSAP) • F = VoIP Wireless (preferably with VMBL being displayed at the PSAP) • J = VoIP Nomadic (preferably with VNOM being displayed at the PSAP) • K = VoIP Enterprise Solutions –Centrex & PBX (preferably with VENT being displayed at the PSAP) <p>All VoIP Class of Service are for both static and nomadic services with the exception of J=VoIP Nomadic. This will be used when a customer is moving from one location to another and is unsure of the class of service they SHOULD be using at that time, as it is different than their normal/predominant class of service.</p> <p>Exhibit 22 (now Section 17) for GIS mapping was unintentionally omitted from the last version of the 02-010 document. Exhibit 22 (now Section 17) has been re-inserted into this version; no changes were made to Exhibit 22 (now Section 17).</p> <p>New Class of Service for Wireless Phase II – added CoS “I” that tells the PSAP the call is from</p> |

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| | | <p>a Phase II capable service, but only phase I information was available. Re-bid ALI for phase II information. Note, re-bid will not guarantee phase II information will be provided.</p> <p>XML Release 4.1 to accommodate i2 standard which was developed by NENA to handle VoIP calls in the current E9-1-1 system. The i2 directory includes schemas used by the i2 web services definitions (WSDL) as well as the i2 WSDL.</p> <p>http://www.nena.org/xml_schemas/nena.htm</p> |
| NENA 02-010 v8 | 03/30/2007 | <p>Establish Function of Change for Master Street Address Guide (MSAG) Data Exchange</p> <p>Function of Change for MSAG options:</p> <p>Insert a range:</p> <ul style="list-style-type: none"> FOC=I defines the current image to be inserted <p>Delete a single range:</p> <ul style="list-style-type: none"> FOC=D defines the current image to be deleted <p>Place footer in document with reference to name formatting when sending in data to the DBMS. Last, First format is the recommended format for residential customer names.</p> <p>The document name has been changed to reflect the new NENA ALI Query Service standard; the document describes data formats and not protocols.</p> <p>The ALI Query Service Standard is available at https://www.nena.org/?page=ALI_Query_Service</p> <p>The formal document name is "04-005 NENA ALI Query Service Standard".</p> |



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| NENA 02-010 v8.1 | 01/08/2008 | Correction to MSAG Data exchange reserved field length. The reserved field should have been shortened 1 character due to the addition of FOC in Revision 8. |
| NENA 02-010 v8.2 | 06/10/2009 | Updated all Uniform Resource Locators (URLs) to agree with new web pages. |
| NENA 02-010 v9 | 12/16/2010 | Modified Exhibit 22 (now Section 17), GIS Data Model, Version 2. Updated to most current template by adding the following new sections: 22.3 SECURITY IMPACTS SUMMARY 22.4 RECOMMENDATION FOR ADDITIONAL DEVELOPMENT WORK 22.8 Additional Impacts (non cost related) |
| NENA-STA-015.10-2018 | 08/12/2018 | Five new CoS for potential use have been added, WDL2, WDL1, WCVC, TEXT, and SDXY. New Section 2.2 established three new wireless CoS (WDL2, WDL1, and WCVC) for use when a wireless 9-1-1 call provides civic oriented data from the National Emergency Address Database (NEAD) and potentially other scenarios, such as pre-provisioned carrier small cells, customer femtocells, or non-mobile phones using wireless network connectivity. New Section 2.2 also established a new CoS of TEXT for text-to-9-1-1, and established a new CoS of SDXY for supplemental geodetic location from third-party. The "Customer Name" field has been renamed as the "Customer Name/Service" field to reflect current usage, and to accommodate the seven standardized "Service Descriptions" and to provide an additional signal to the telecommunicator to pay attention to both x, y |

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| | | coordinates and civic address. In addition, also specified that the existing "VoIP Wireless" (VMBL) CoS established in 2006 SHOULD be set up to work similar to WPH2 x, y coordinates in the context of non-CMRS and wireless IP services, and SHOULD also be renamed as "Other Mobile," OMBL. In order to have a clear single up-to-date reference for all currently recognized CoS (which would now also include WDL2, WDL1, WCVL, TEXT, SDXY, and OMBL), a new Section 18 has been added, and a new Section 19 has been added to also have a clear single up-to-date reference for standardized "Service Descriptions" in the Customer Name/Service field. In addition, the numbering in the document was modified to be consecutive and consistent with obsoleted versions. |

2 Technical Description

2.1 Types of Data Exchange Formats

All data exchange formats utilize American Standard Code for Information Interchange (ASCII) characters. The NENA Data Technical Committee has established 4 versions of standard data formats for use by Service Providers and Data Base Management System Providers when exchanging E9-1-1 data base information. Four (4) versions of standard format have been defined for each of the following; ALI source data exchange, Master Street Address Guide (MSAG) data exchange, Header and trailer records, Wireless data formats are included in Versions 3.1 and 4.

Historically, standard format Version 1.0 had been defined for the ALI Request Response message sent to the PSAP screen.

Version 1 formats were the original NENA recommended formats utilizing the 240 character format for Data Exchange; 160 character format for MSAG Data Exchange and 160 character format for Header and Trailer records.

Version 2 formats recognized that the original formats needed to be expanded to accommodate additional data fields critical to some data providers and also recognized that NENA should position the standard record for the future. Version 2 formats contained all data fields resident in Version 1 formats utilizing a 512 character format for Data Exchange; 200 character format for MSAG Data Exchange and 200 character formats for Header and Trailer records. However, both Version 1.0 and 2.0 are obsolete and have been replaced by Version 2.1. See Sections 3 and 4.

Version 3 formats recognize that the previous formats were limiting distribution of data as technology evolved and the Data Technical Committee, after much discussion, arrived at the present NENA Version 3 format, included in this document. This format takes a "Tag Data" approach to information exchange for both wireline and wireless data distribution. Benefits include flexibility, faster programming changes, more efficient data transmission and smaller file sizes.

Version 4 formats recognize the need for an industry standard naming convention, greater flexibility and faster programming changes. NENA Version 4 has been revised to support these needs and to introduce reusability of defined data elements, a method to introduce Schema changes that are backward compatible and do not impact operating applications. This revised XML format can be supported by off the shelf XML tools to perform proper validation of XML documents. The revised NENA Version 4 establishes a design philosophy for all new XML schema and data development.

The NENA Data Technical Committee requires that Service Providers maintain consistency by utilizing formats consistent to one version; i.e. Header and Trailer records MUST be the same version format as the Data or MSAG Exchange formats utilized. It should be noted that some things in the past may not have been clearly defined in E9-1-1 (e.g., Customer Name and Street Address fields potentially containing special characters), and this may create additional potential translation complications between E9-1-1 and NG9-1-1, which may also include translation complications for voice-based texting between E9-1-1 and NG9-1-1 (compare, "@" in Real-Time Text (RTT) with "(at)" in TTY). Prospectively, 9-1-1 stakeholders making changes to E9-1-1 are urged to be sensitive to any potential complications such changes may have for the transition to NG9-1-1.

2.1.1 Common Considerations:

All data exchange formats utilize ASCII characters. ASCII characters used in alpha only and alpha/numeric fields SHOULD be limited to A thru Z, a thru z (some legacy systems will not understand lower case), 0 thru 9, comma `, ' , forward slash ` / ` , semi colon ` ; ` , ampersand ` & ` , and apostrophe ` ' ` . Spaces are allowed with one exception----the first character of a field may not be a space. Spaces between words are acceptable. Other characters may impact the accurate processing of data.

Data Base Management System Providers SHOULD document how they utilize versions 1, 2, 3 and 4 and the fields that their software systems can utilize.

The "General Use" field may be used when exchange partners agree to exchange information not defined.

Header and Trailer records MUST be the same version format as the Data or MSAG Exchange formats utilized.

A full update record MUST be provided for all data exchange versions and function-of-change updates.

Data TYPE indicators are as follows: A= Alpha, N=Numeric, V=Variable, AN=Alpha Numeric, AV=Alpha Variable

2.1.2 Version 1 & 2 formats:

- Standard field location.
- Fixed record lengths.
- Data exchange formats require that complete data records be exchanged.
- All data fields are treated as "left-justified" with trailing spaces.
- Unused fields are space-filled.

2.1.3 Version 3 data formats:

- A tag data record is a record of varying length, comprised of pre-defined tag labels and the associated data elements.
- There is no particular sequence of the tag/data combinations within a Tag Data Record.
- Each tag and its associated data are separated from all other tag/data combinations by a pre-defined field separator.
- A pre-defined End of Record character follows each Tag Data Record.
- The receiving Data Base Management System Provider will specify the minimum set of tag/data elements needed by that system to uniquely identify and process the record.
- If the field is not being used (I.E: "Street Suffix", "Post Directional", "Customer Code") then the label is not used.
- Data Technical Committee authorized new tags may be added to the record without changing the file format.
- Header records will employ cycle counting to ensure a cycle of updates is not missed.
- Trailer records will employ record counting to ensure a record within an update file is not missed.

2.1.4 Version 4 Description Summary:

- Tags are angled brackets with the data between them. An example of a start-tag and end-tag is <NAM></NAM>.
- Content is the data between the start-tag and end-tag.
- An Element is the combination of start-tag, data and end-tag. An example of an element is <NAM>JOHN DOE</NAM>.
- Tags can have Attributes. An example is <RECORD Num="1"> which indicates that the elements for record number 1 follow this tag.
- Elements may contain other elements. A "StreetAddressType" is an example of container element with sub-elements in a group that identify the component parts for a street address and can be reused wherever a "StreetAddressType" element is needed.

```
<xs:complexType
name="StreetAddressType">
  <xs:all>
    <xs:element name="HouseNum"/>
    <xs:element name="HouseNumSuffix"/>
    <xs:element name="PrefixDirectional"/>
    <xs:element name="StreetName"/>
    <xs:element name="StreetSuffix"/>
    <xs:element name="PostDirectional"/>
    <xs:element
name="MSAGCommunity"/>
    <xs:element
name="PostalCommunity"/>
    <xs:element name="StateProvince"/>
    <xs:element name="County"/>
    <xs:element name="TARCode"/>
    <xs:element name="PostalZipCode"/>
  </xs:all>
</xs:complexType>
```

Individual components or elements that make up a street address are housed in a container element called StreetAddressType.

This example is intended to show how related data elements may be grouped together and is not intended to be accurate in form or structure.

Refer to the actual XML documents located on the NENA web site at http://www.nena.org/xml_schemas/nena.htm

- In XML, records are referred to as "documents".
- The XML schema defines the structure, sequence and needed elements within an XML document.
- The receiving Data Base Management System provider will determine the minimum set of elements needed by that system to uniquely identify and process the record.
- If the data is not being used (I.E: "Street Suffix", "Post Directional", "Customer Code") then the Element may be omitted.
- If data is present in an XML data element but the receiving Database Management System does not use the data element, the receiving Database Management System will ignore it.

- Version 4 utilizes Generation and Release controls. A Release is a subset of a Generation. A Release may be changed such as adding new tags without effecting working applications. Generation changes will affect backward compatibility. A schema from a newer Generation cannot be used to validate documents from a previous Generation. The NENA Data Technical Committee will coordinate all Generation and Release changes.
- Header elements will employ cycle counting to ensure a cycle of updates is not missed.
- Trailer elements will employ record counting to ensure a record within an update file is not missed.
- Supporting documentation for the most current and all previous XML schema Generations and Release s will be available on the NENA web site.
- This document does not contain a complete description of XML elements and features.
- Details on each XML Generation, Release, Element Type Definition and Schema documentation is available on the NENA web site at http://www.nena.org/xml_schemas/nena.htm. More information on XML may be found at <http://www.w3.org/XML/>.

2.2 Types of Data Elements within Data Formats and Additional Guidance

In the past, there were clearer dividing lines and less convergence between different networks and technologies, and there was much less room for reasonable interpretation regarding when and how to use certain data elements, with CoS and the Customer Name field being primary current examples. In addition, there may also be increased potential for the provision of location information from a third-party that is separate from the mandatory location required by applicable regulation from the wireless carrier/originating service provider. Without some additional guidance and explanation on the data elements within the data formats, the primary purpose and use of the data formats can be undermined and erode data exchange and usefulness of these legacy data formats. Therefore, additional guidance is needed and provided herein in the following subparts on when and how to use the data elements within the data formats in a more standardized manner.

2.2.1 Additional Guidance on the three Classes of Service for Wireless Network Services displaying Civic Address as Primary ALI

Three new wireless CoS are being established for use when a wireless 9-1-1 call provides civic oriented data from the National Emergency Address Database (NEAD) and from other sources. The three are as follows:

- WDL2 indicates a wireless 9-1-1 call that provides civic oriented data (address and sub-address location [where appropriate]) in addition to traditional WPH2 geodetic X, Y and Uncertainty data associated with the caller's location (where available). When this CoS is used, it indicates the civic oriented data is expected to meet the highest quality level criteria to be dispatchable, and indicates that the sub-address location within the building address is very close to the caller's location.
- WDL1 indicates a wireless 9-1-1 call that provides civic oriented data (address and building zone [where appropriate]) in addition to traditional WPH2 geodetic X, Y and Uncertainty data associated with the caller's location (where available). When this CoS is used, it indicates the civic oriented data is expected to meet the medium-quality level criteria to be dispatchable by building zone but also indicates a less detailed location than WDL2.
- WCVL indicates a wireless 9-1-1 call that provides civic oriented data (address) in addition to traditional WPH2 geodetic X, Y and Uncertainty data associated with the caller's location (where available). When this CoS is used, it indicates the civic oriented data is not expected to meet the criteria to be dispatchable by either building zone (WDL1) or sub-address location (WDL2).

With regard to these three new CoS for wireless network services displaying civic address as the primary ALI, the current implementation expectation is for 9-1-1 customer premises equipment (CPE) to use existing ALI display fields. But other implementation issues (such as the specific location logic between the three CoS quality levels using the criteria from the NEAD, additional telecommunicator training, integration and relationship with display of the WPH1 cell tower location, and potential changes to 9-1-1 mapping configurations) SHOULD remain under review for additional work, testing, and further recommendations by NENA and other stakeholders. Moreover, as the quality level of WPH2 location indoors may be enhanced in the future independent from the NEAD, there may be additional factors to consider down the road on such implementation issues.

2.2.2 Additional Guidance to rename the “Customer Name” field to “Customer Name/Service” field and on standardized “Service Descriptions”

While long called the “Customer Name” field in NENA documents, for over a decade wireless 9-1-1 calls have included the name of the facilities-based wireless service provider (and sometimes their contact telephone number as well). The field has been used to indicate “Fixed” in the case of a customer femtocell, to indicate “@Home” in the case of a UMA device, and to indicate more recently sometimes “Verify,” “HotSpot,” and/or “Wi-Fi Calling” separately or in combination as may have been chosen by the applicable wireless carrier and/or 9-1-1 authority.

Instead of using term “Customer Name” for the field, using “Customer Name/Service” is more consistent with how the field has been used and how it may be used in the future. Accordingly, in Section 5 and Section 9, the name of the field has been changed to “Customer Name/Service” and a new Section 19 with seven standardized Service Descriptions for the Customer Name/Service field has been added to this document. The recommended Service Descriptions in Section 19 may be used alone or in combination with end user customer name or service provider name. Where more than one of the above may apply, it is generally recommended that the one presenting the highest level quality of location information SHOULD be used in the event of a conflict. However, unnecessarily combining Service Descriptions or using non-standardized Service Descriptions can lessen usefulness and SHOULD be avoided. Therefore, it is expected that any existing uses of non-standardized Service Descriptions will promptly be reviewed by 9-1-1 stakeholders, and thereafter inconsistent descriptions (with the seven identified in Section 19) should stop being used.

2.2.3 Additional Guidance on Customer Name/Service field and standardized “Service Descriptions” for Wireless Network Services displaying Civic Address as Primary ALI

In order to help clarify and provide an additional signal to the telecommunicator to pay attention to both the x, y coordinates and the civic address, it is recommended that where the end user subscriber name is not placed in the Customer Name/Service field (or in addition to it, if applicable), the Customer Name/Service field SHOULD include displaying “WRLSW/ CIVIC SPECIFIC” for the WDL2 CoS; WRLS W/ CIVIC ZONE for the WDL1 CoS; and WRLS W/ CIVIC RANGE for the WCVS CoS. Accordingly, the three new CoS of WDL2, WDL1, and WCVS are in Section 18 and three standardized Service Descriptions are in Section 19.

2.2.4 Additional Guidance on CoS and on Customer Name/Service field and standardized "Service Description" for Wireless Carrier Small Cells

In 2013, per ATIS-0500025, for purposes of only the E2 interface in J-STD-036-C-2, the FIXD classification was introduced associated with position source 53 for provisioning a small, semi-static wireless cell covering areas less than 100 meters, in cases where civic address information would be provisioned as additional secondary information. The purpose of the ATIS recommendation was to provide an additional signal to the telecommunicator to pay attention to both the x, y coordinates and the civic address. However, since that time the FCC has adopted rule amendments with specifics on wireless carriers providing dispatchable location or x, y coordinates within 50 meters as primary ALI. Accordingly, rather than establishing a new CoS for small cells, it is recommended that:

- (1) Where a dispatchable location would be displayed as primary ALI of the caller, either WDL2 or WDL1 should be used, as applicable, based on the specific location logic between WDL2 and WDL1 under the criteria for the NEAD (potentially via translating either the FIXD or RESD classification associated with position source 53 or 54).
- (2) Where x, y coordinates would still remain as primary ALI of the caller and for cases where the small cell coverage area is generally believed to be 50 meters or less and where the end user subscriber name is not placed in the Customer Name/Service field (or in addition to it, if applicable) associated with the WPH2 CoS, the Customer Name/Service field SHOULD include displaying ""INDOOR SMCELL/DAS HEAD." See Section 19.

2.2.5 Additional Guidance on CoS and on Customer Name/Service field and standardized "Service Description" for Customer Femtocells

As of the adoption of the revisions of this to document, at least one wireless carrier deploys customer femtocells that also display pre-provision location civic address information as additional, secondary information and uses the Customer Name/Service field to provide an additional signal to the telecommunicator to pay attention to both the x, y coordinates and the civic address. However, as wireline replacement continues, customer femtocells may start to display civic address information as primary ALI. Accordingly, rather than establishing a new CoS for customer femtocells, it is recommended that:

- (1) Where a dispatchable location would be displayed as primary ALI of the caller, either WDL2 or WDL1 should be used, as applicable, based on the specific location logic between WDL2 and WDL1 under the criteria for the NEAD (potentially via translating either the FIXD or RESD classification associated with position source 53 or 54).
- (2) Where x, y coordinates would still remain as primary ALI of the caller and for cases where the customer femtocell coverage area is generally believed to be 50 meters or less and where the end user subscriber name is not placed in the Customer

Name/Service field associated with the WPH2 CoS, the Customer Name/Service field SHOULD include displaying "FEMTOCELL." See Section 19.

2.2.6 Additional Guidance on Customer Name/Service field and standardized "Service Description" for Wi-Fi Calling

As of adoption of the most revision of this document, at least three nationwide wireless carriers put "WI-FI CALLING" in the Customer Name/Service field. In the current context, when "WI-FI CALLING" is being displayed in the Customer Name/Service field, a mobile handset's ability to actually be mobile may be very limited during a 9-1-1 call, and the end user moving the mobile handset outside this limited area may disconnect the caller using Wi-Fi calling from a mobile handset for 9-1-1 calls. For purposes of troubleshooting issues, Wi-Fi Calling the Customer Name/Service field may also assist the service provider in identifying the specific network. The type of location information with 9-1-1 calls using Wi-Fi connectivity today may be similar to wireless 9-1-1, may be similar to Interconnected VoIP, may vary based on circumstances or service provider, and may involve Wi-Fi 9-1-1 calling from tablet as opposed to a mobile handset. Accordingly, due to the current potential locations situations and scenarios, because the caller may be disconnected if they were to become mobile with the mobile handset or tablet, and for potential troubleshooting purposes, including "WI-FI CALLING" in the Customer Name/Service field provides additional context information. See Section 19.

2.2.7 Additional Guidance on CoS and on Customer Name/Service field and standardized "Service Description" for Wireless Home Phones

As of adoption of the most recent revision of this document, there is no information that informs telecommunicators that the x, y coordinates from a Wireless Home Phone (WHP) is not from a generally mobile handset but rather is instead from an adapter that may be nomadic or static but generally not mobile (unless perhaps in moving motor home). In addition, for purposes of only the E2 interface in J-STD-036-C-2, the RESD classification had been introduced associated with position source 54 for provisioning a static wireless device at a residential location. However, as wireline replacement continues, WHPs may start to display civic address information as primary ALI. Accordingly, rather than establishing a new CoS for WHPs, it is recommended that:

- (1) Where a dispatchable location would be displayed as primary ALI of the caller using a wireless 9-1-1 solution, either WDL2 or WDL1 should be used, as applicable, based on the specific location logic between WDL2 and WDL1 under the criteria for the NEAD (potentially via translating either the FIXD or RESD classification associated with position source 53 or 54).
- (2) Where a dispatchable location would be displayed as primary ALI of the call using a VoIP 9-1-1 solution, the applicable VoIP CoS should be used, and where the end

user subscriber name is not placed in the Customer Name/Service field, use of "NON-MOBILE PHONE" in the Customer Name/Service field should be considered to provide additional context information.

- (3) Where x, y coordinates would be displayed as primary ALI of the caller using a wireless 9-1-1 solution and WPH2 is used for the CoS, use of "NON-MOBILE PHONE" in the Customer Name/Service field should be considered to provide additional context information. See Section 19.

2.2.8 Additional Clarification and Guidance on the Existing VoIP Wireless (VMBL) CoS and Replacement with a new CoS of Other Mobile (OMBL)

In the past, there appeared to be clearer dividing lines and less potential for confusion or varying interpretation regarding when a particular CoS SHOULD be associated with x, y coordinates as the primary location for CPE and mapping purposes (e.g., the WPH2 CoS and CMRS service under FCC Rule 20.18) compared to when a particular CoS SHOULD be associated with civic address as the primary location for CPE and mapping purposes (e.g., the VOIP CoS and Interconnected VoIP service under FCC Rule 9.5). In 2006 when the "VoIP Wireless" was incorporated into this document as a new CoS, there being no definition of "VoIP Wireless" and there was also no statement or guidance whether x, y coordinates or civic address were to be the primary address location for CPE and mapping purposes. In addition in late 2015, the FCC approved waivers for Wi-Fi calling (also called Voice over Wi-Fi) and there is also a growing greater potential for over the top (OTT) voice over a wireless broadband network from Applications separate from the underlying wireless network carrier. Accordingly, with regard to the existing "VoIP Wireless" (VMBL) CoS established in 2006, to the extent it continues to be used it is clarified to be expected to work similar to WPH2 x, y coordinates in the context of non-CMRS and wireless IP services. In other words, to the extent it continues to be used the existing VMBL CoS is clarified to be used with x, y coordinates being the primary expected address location for CPE and mapping purposes, but civic address information MAY also be displayed when providing civic address information is believed to be within 50 meters. However, given that the term VoIP is generally associated with civic address as the primary location and given that Wi-Fi calling and OTT voice over wireless broadband may have differences from legacy CMRS services (e.g., potentially no WPH1 cell tower information may be presented, potentially rebid may return no additional results, and potentially existing CMRS regulations may not be applicable or may ultimately be adopted to be different from legacy CMRS services), replacement of the VMBL CoS with a CoS of "OMBL" for "Other Mobile" would be a more PREFERABLE way to distinguish such from legacy CMRS even though the services may be similarly mobile and present x, y coordinates as the primary location. (For non-mobile and nomadic services with a civic address as the primary location using those same Wi-Fi calling or OTT voice using wireless broadband separate from the underlying wireless carrier

network, the existing VNOM CoS would be considered most appropriate and other VOIP CoS considered appropriate as well.) Accordingly, it is recommended that a CoS of OMBL replace the existing CoS of VMBL when x, y coordinates are to be primary location from non-legacy CMRS types of technologies that are separate from the underlying wireless carrier network.

2.2.9 Additional Guidance on new CoS for Supplemental Geodetic Location from Third-Party (SDXY) CoS

The SDXY CoS is intended to be used to identify the provision of location information that is provided by a third-party separate from the mandatory location required by applicable regulation from the wireless carrier/originating service provider. The SDXY CoS indicates supplementary geodetic location information (with confidence and uncertainty data) as the primary location type for mapping purposes (similar to WPH2 CoS and OMBL CoS where geodetic location is the primary location information, respectively, from a wireless carrier or an Interconnected VoIP originating service provider), and the SDXY CoS indicates the use of an IP network to transmit location information from the device to a third-party location provider separately from the call. The SDXY CoS geodetic location is intended to be derived from commercial-grade device-based hybrid location technologies, and may be enriched by other handset-based location technologies where considered appropriate by the third-party location provider. It is expected that the SDXY CoS geodetic location data from the third-party provider may allow for manual and/or automatic updates subject to capabilities of customer-premises equipment to perform such requests.

3 NENA V1.0

VERSION 1.0 FORMAT FOR DATA EXCHANGE

VERSION 1.0 FORMAT FOR MSAG DATA EXCHANGE

VERSION 1.0 HEADER FORMAT FOR DATA EXCHANGE

VERSION 1.0 TRAILER FORMAT FOR DATA EXCHANGE

Have Been Replaced by Version 2.1 Formats

4 NENA V2.0

VERSION 2.0 FORMAT FOR DATA EXCHANGE

VERSION 2.0 FORMAT FOR MSAG DATA EXCHANGE

VERSION 2.0 HEADER FORMAT FOR DATA EXCHANGE

VERSION 2.0 TRAILER FORMAT FOR DATA EXCHANGE

Have Been Replaced by Version 2.1 Formats

5 VERSION 2.1 FORMAT FOR DATA EXCHANGE

| FIELD NAME | POSITION | BYTES | TYPE | DESCRIPTION |
|---------------------|----------|-------|------|---|
| Function Code | 1 | 1 | A | Type of activity the record is being submitted for. Valid entries: C = Change D = Delete I = Insert U = Unlock M = Migrate |
| NPA | 2-4 | 3 | N | Three-digit area code (Number Plan Area) of the Calling Number. |
| Calling Number | 5-11 | 7 | N | Seven-digit telephone number of the Calling Number. |
| House Number | 12-21 | 10 | AN | House number. The field SHOULD be space filled if no house number is available. <i>NOTE: Although the House Number field is ten characters, it is understood that telephone companies MAY only support up to 8 characters.</i> |
| House Number Suffix | 22-25 | 4 | AN | House number extension (e.g. 1/2). The field SHOULD be space filled if no suffix applies. |
| Prefix Directional | 26-27 | 2 | A | Leading street direction prefix. The field SHOULD be space filled if no prefix applies. Valid entries: N S E W NE NW SE SW |
| Street Name | 28-87 | 60 | AN | Valid service address of the Calling Number. |

NENA Standard Data Formats for 9-1-1 Data Exchange & GIS Mapping
NENA-STA-015.10-2018 (originally 02-010), August 12, 2018

| FIELD NAME | POSITION | BYTES | TYPE | DESCRIPTION |
|-----------------------|----------|-------|------|---|
| Street Suffix | 88-91 | 4 | A | Valid street abbreviation, as defined by the U. S. Postal Service Publication 28, Appendix C. (e.g. AVE) |
| Post Directional | 92-93 | 2 | A | Trailing street direction suffix. The field SHOULD be space filled if no suffix applies. Valid entries: <div style="text-align: center;"> N S E W NE NW SE SW </div> |
| Community Name | 94-125 | 32 | A | Valid service community of the street name/house number as designated by the MSAG. |
| State | 126-127 | 2 | A | Alpha state abbreviation (e.g. TX) |
| Location | 128-187 | 60 | AN | Additional address information (free formatted) describing the exact location of the Calling Number (e.g. Apt 718). |
| Customer Name/Service | 188-219 | 32 | AN | Subscriber name associated with the Calling Number. Preferred format for an individual customer name (not a business) is: Last, First and, optionally, a suffix which may be generation (Jr, III) and/or title (Phd, Esq, MD). Honorifics (Mr., Mrs, Ms.) SHOULD not be included as part of the name. Alternatively, in order to provide the telecommunicator with an additional signal to pay attention to both the x, y coordinates and the civic address (and/or where the individual customer name is not provided) and to provide other clarifying service type information in a standardized manner, the field MAY be used in a standard way by carriers, with specific standardized "Service Descriptions." See Sections 2.2 and 19 of this document. |

NENA Standard Data Formats for 9-1-1 Data Exchange & GIS Mapping
NENA-STA-015.10-2018 (originally 02-010), August 12, 2018

| FIELD NAME | POSITION | BYTES | TYPE | DESCRIPTION | |
|------------------|----------|-------|------|--|--|
| Class of Service | 220 | 1 | AN | Value of: | |
| | | | | 1 = Residence | 8 = Mobile |
| | | | | 2 = Business | 9 = Residence OPX |
| | | | | 3 = Residence PBX | 0 = Business OPX |
| | | | | 4 = Business PBX | A = Customer Owned Coin Telephone (COCT) |
| | | | | 5 = Centrex | B = Not Available <i>Footnote</i> ⁴ |
| | | | | 6 = Coin 1 Way out | G = Wireless Phase I |
| | | | | 7 = Coin 2 Way | H = Wireless Phase II |
| | | | | I = Wireless Phase II with Phase I information | |
| | | | | V = VoIP Services Default CoS | C = VoIP Residence |
| | | | | D = VoIP Business | E = VoIP Coin/Pay Phone |
| | | | | F = Other Mobile | J = VoIP Nomadic |
| | | | | K = VoIP Enterprise Services – Centrex & PBX | For all VoIP CoS see notes on page 13 |
| 08/12/2018 | | | | T = Telematics Page 31 of 119 | |



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| FIELD NAME | POSITION | BYTES | TYPE | DESCRIPTION |
|-----------------|----------|-------|------|--|
| Type of Service | 221 | 1 | N | Value of: 0 = Not FX (Foreign Exchange Service) nor Non-Published 1 = FX in 911 serving area 2 = FX outside 911 serving area 3 = Non-Published 4 = Non-Published FX in serving area 5 = Non-Published FX outside 911 serving area 6 = Local Ported Number (LNP) (Local Number Portability) 7 = Interim Ported Number |
| Exchange | 222-225 | 4 | AN | Local Exchange Carrier exchange identifier for the serving telephone office of the customer. |
| ESN | 226-230 | 5 | AN | Emergency Service Number associated with the House number and Street Name. <i>NOTE: ESN field may be space filled when the Data Base Management System Provider is validating the address. The Service Provider providing the E9-1-1 Selective Routing will provide a list of ESNs available for assignment.</i> |
| Main NPA | 231-233 | 3 | N | Three-digit area code of the Main Number associated with the Calling Number. |
| Main Number | 234-240 | 7 | N | Seven Digit telephone number of the Main Number associated with the Calling Number. |
| Order Number | 241-250 | 10 | AN | Service order number for the activity establishing this record. |
| Extract Date | 251-256 | 6 | N | Date on which the record was created in the format MMDDYY |



NENA Standard Data Formats for 9-1-1 Data Exchange & GIS Mapping
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| FIELD NAME | POSITION | BYTES | TYPE | DESCRIPTION |
|---|----------|-------|------|---|
| County ID | 257-260 | 4 | AN | County Identification Code (usually the FIPS code) <i>NOTE: County Identification field is used to identify the county of call origination. The Subcommittee recommends use of the FIPS code assigned to each county by the U S Census Bureau.</i> |
| Access Infrastructure Provider (Company ID 1) | 261-265 | 5 | AN | NENA registered Company Identification code of the Access Infrastructure Provider |
| Source ID | 266 | 1 | AN | Code that indicates whether data is part of the initial data base creation process or part of the daily update process. Daily = Space, Initial Load = C |
| Zip Code | 267-271 | 5 | AN | Postal Zip Code |
| Zip + 4 | 272-275 | 4 | AN | Postal Zip Code Extension |
| General Use | 276-286 | 11 | AN | This field will be mutually used by data exchange partners to pass information not defined in previous fields. |
| Customer Code | 287-289 | 3 | AN | Code used to uniquely identify a customer. |
| Comments | 290-319 | 30 | AN | Optional notes, MAY be displayed at PSAP |
| X Coordinate | 320-328 | 9 | AN | Longitude/ X coordinate |
| Y Coordinate | 329-337 | 9 | AN | Latitude/ Y coordinate |
| Z Coordinate | 338-342 | 5 | AN | Structure elevation (This is not intended to include floor level or uncompensated barometric pressure.) |
| Cell ID | 343-348 | 6 | AN | Cellular Identification Number indicating a geographic region of cellular coverage. |



NENA Standard Data Formats for 9-1-1 Data Exchange & GIS Mapping
NENA-STA-015.10-2018 (originally 02-010), August 12, 2018

| FIELD NAME | POSITION | BYTES | TYPE | DESCRIPTION |
|------------------------------|----------|-------|------|--|
| Sector ID | 349 | 1 | AN | Sub set/section of a cell. |
| TAR Code | 350-355 | 6 | AN | Taxing Area Rate Code |
| Reserved | 356-376 | 21 | AN | This field is reserved for the Data Base Management System Provider's use. |
| ALT # | 377-386 | 10 | N | Customer Number being remote call forwarded in Interim Number Portability service. |
| Expanded Extract Date | 387-394 | 8 | N | Date on which the record was created in the format YYYYMMDD |
| NENA Reserved | 395-475 | 81 | AN | This field is reserved for NENA Data Technical Committee Assignment |
| Data Provider (Company ID 2) | 476-480 | 5 | AN | NENA registered Company Identification code of the Data Provider (Note 1) |
| Reserved | 481-511 | 31 | AN | This field is reserved for the Data Base Management System Provider's use. |
| End of Record | 512 | 1 | AN | Always an asterisk (*). |

NOTE: All fields are left justified, with trailing spaces.

The Service Provider providing E9-1-1 Selective Routing MUST provide the governmental entity with a list of ESNs available for assignment by MSAG development personnel.

NOTE 1: The Data Provider ID (Company ID 2) field is used to carry the NENA Company ID of a PS/911 data provider. The NENA Reserved field has been reduced by 5 bytes to accommodate the Data Provider ID field. In addition the "Company ID" field that represents the Dialtone Provider NENA Company ID has been renamed to "Access Infrastructure Provider ID" (Company ID 1) and the definition clarified.

6 VERSION 2.1 FORMAT FOR MSAG DATA EXCHANGE

| NAME | POSITION | BYTES | TYPE |
|-----------------------|----------|-------|------------|
| Prefix Directional | 1-2 | 2 | AN |
| Street name | 3-62 | 60 | AN |
| Street Suffix | 63-66 | 4 | AN |
| Post Directional | 67-68 | 2 | AN |
| Low Range | 69-78 | 10 | AN |
| High Range | 79-88 | 10 | AN |
| Community Name | 89-120 | 32 | A |
| State | 121-122 | 2 | A |
| Odd/Even | 123 | 1 | O, E or B |
| ESN | 124-128 | 5 | AN |
| Extract Date | 129-134 | 6 | MMDDYY |
| PSAP ID* | 135-138 | 4 | AN |
| County ID | 139-142 | 4 | AN |
| Exchange | 143-146 | 4 | AN |
| General Use | 147-166 | 20 | AN |
| TAR Code | 167-172 | 6 | AN |
| Function of Change | 173 | 1 | A |
| Reserved | 174-191 | 18 | AN |
| Expanded Extract Date | 192-199 | 8 | N |
| End of record | 200 | 1 | Always "*" |

NOTE: All fields are left justified, with trailing spaces.

*Note: In this instance, "PSAP ID" means "the Code identifying the PSAP associated with the assigned ESN," which may be different than how "PSAP ID" is used in 18.5.2 and 18.5.4 of this document where the term means "the Code identifying the PSAP as listed in the FCC PSAP registry."

Function of Change for MSAG options

Insert a single range:

FOC=**I** defines the current image to be inserted

Delete a single range:

FOC=**D** defines the current image to be deleted

Changes to an MSAG Range SHOULD appear in the Delta Files as a "D" record followed by an "I" record.

Deprecated MSAG FOC options

Some DBMS providers provide delta MSAG files using FOC codes that were documented for Version 3.1 in the previous versions of this document. These codes are not part of the NENA 02-010 standard – but are shown below for documentation.

Insert a range:

FOC=**I** defines the current image to be inserted (no FOC=X used)

Change a single range:

FOC=**X** comes first to define the current (before) image

FOC=**C** comes second to define the after image

Delete a single range:

FOC=**D** defines the current image to be deleted (no FOC=X used)

Split one range:

FOC=**X** comes first to define the current (before) image

FOC=**S** or **L** comes next (two or more FOC=S records) to define two or more ranges after the split (S&L are the same FOC and cannot be used interchangeably)

Join two or more ranges:

FOC=**X** comes first to define two or more before images – MUST be in a sending sequence by house number

FOC=**J** follows to define the single after image for the join (two or more X records must proceed the J)

7 VERSION 2.1 HEADER FORMAT FOR DATA EXCHANGE

| NAME | POSITION | BYTES | TYPE |
|-----------------------|----------|-------|------------|
| Header Indicator | 1-5 | 5 | "UHL" |
| Extract Date | 6-11 | 6 | MMDDYY |
| Company Name | 12-61 | 50 | AN |
| Cycle Counter | 62-67 | 6 | N |
| County ID | 68-71 | 4 | AN |
| State | 72-73 | 2 | A |
| General Use | 74-93 | 20 | AN |
| Release Number | 94-96 | 3 | N |
| Format Version | 97 | 1 | N |
| Expanded Extract Date | 98-105 | 8 | N |
| Reserved | 106-199 | 94 | AN |
| End of Record | 200 | 1 | Always "*" |

NOTE: All fields are left-justified, with trailing spaces, except the Cycle Counter, this field will be right-justified with leading spaces.

Header records will employ cycle counting to ensure a cycle of updates is not missed.

When used with an ALI source data file, the 'Reserved' field will be expanded to 406 bytes (when used with an ALI source data file).

8 VERSION 2.1 TRAILER FORMAT FOR DATA EXCHANGE

| NAME | POSITION | BYTES | TYPE |
|-----------------------|----------|-------|------------|
| Trailer Indicator | 1-5 | 5 | "UTL |
| Extract Date | 6-11 | 6 | MMDDYY |
| Company Name | 12-61 | 50 | AN |
| Record Count | 62-70 | 9 | N |
| Expanded Extract Date | 71-78 | 8 | N |
| Reserved | 79-199 | 121 | AN |
| End of Record | 200 | 1 | Always "*" |

NOTE: All fields are left justified, with trailing spaces, except for the Record Count; this field will be right-justified with leading spaces.

Trailer records will employ record counting to ensure a record within an update file is not missed.

When used with an ALI source data file, the 'Reserved' field will be expanded to 433 bytes.

9 VERSION 3.1 FORMAT FOR DATA EXCHANGE

| NAME | LABEL | MAX # BYTES | TYPE | DESCRIPTION |
|--------------------|---------------|----------------|------|---|
| Record Type | DAT or RTN | 0 | A | Indicates start of data record (label only, no data follows). Valid labels: DAT = Data Record sent from the Service Provider to the Data Base Management System Provider RTN = Data record returned from the Data Base Management System Provider to the Service Provider |
| Status Indicator | STI | 1 | AN | Record status indicator. Valid entries: E = Error C = Completed P = Pending processing U = Unprocessed Gateway received but not sent to processing, (future date) |
| Function of Change | FOC | 1 | A | Type of activity the record is being submitted for. Valid "x" entries: C = Change D = Delete I = Insert U = Unlock M = Migrate E = Delete error record |

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| NAME | LABEL | MAX # BYTES | TYPE | DESCRIPTION |
|----------------------|-------|-------------|------|--|
| Calling Party Number | CPN | 10 | N | Number of the Calling Party. Emergency Location Identification Number (ELIN) – A valid North American Numbering Plan format telephone number assigned to the Multi-Line Telephone Systems Operator by the appropriate authority that is used to call to a PSAP and is used to retrieve the ALI for the PSAP. The ELIN MAY be the same number as the ANI. The North American Numbering Plan number may in some cases not be a dialable number. <i>Footnote ³</i> |
| House Number | HNO | 10 | AN | House Number. <i>Footnote <u>1,2,3</u></i> |
| House Number Suffix | HNS | 4 | AN | House number extension (e.g. 1/2). <i>Footnote <u>1,2,3</u></i> |
| Prefix Directional | PRD | 2 | A | Leading street direction prefix. <i>Footnote <u>1,2,3</u></i> Valid "x" Entries: <div style="text-align: center;">N S E W NE NW SE SW</div> |
| Street Name | STN | 60 | AN | Valid service address of the Calling Party Number. <i>Footnote <u>1,2,3</u></i> |

¹ Where an MSAG exists, *MUST* fit the MSAG entry.

² Primary address associated with the Calling Party Number

³ *MUST* include all (Telephone Number (TN) USERS information on all Multi-Line Telephone Systems that will facilitate the implementation of enhanced 9-1-1 on all PBX, Key, Hybrid and Centrex Systems. Resellers *MUST* supply end user specific name and location information, not information pertaining to the name and location of the Reseller.



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| NAME | LABEL | MAX # BYTES | TYPE | DESCRIPTION |
|-----------------------|-------|----------------|------|---|
| Street Suffix | STS | 4 | A | Valid street abbreviation, as defined by the U S Postal Service Publication 28, Appendix C. (e.g. AVE) <i>Footnote 1,2,3</i> |
| Post Directional | POD | 2 | A | Trailing street direction suffix. <i>Footnote 1,2,3</i> Valid "x" entries: <div style="display: flex; justify-content: space-around; margin-top: 5px;"> NSEW </div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> NENWSESW </div> |
| MSAG Community Name | MCN | 32 | A | Valid service community name as identified by the MSAG. <i>Footnote 1,2,3</i> |
| Postal Community Name | PCN | 32 | A | Valid service community name as identified by the U S Postal Service. <i>Footnote 3</i> |
| State/Province | STA | 2 | A | Alpha US state, Canadian province abbreviation e.g., TX (Texas), ON (Ontario) <i>Footnote 1,2,3</i> |
| Location | LOC | 60 | AN | Additional location information (free formatted) describing the exact location of the Calling Party Number (e.g., Apt 718, or cell sector A) Emergency Response Location (ERL) – A Location to which a 9-1-1 emergency response team may be dispatched. The location SHOULD be specific enough to provide a reasonable opportunity for the emergency response team to quickly locate a caller anywhere within it. <i>Footnote 2,3 This information MAY be displayed at the PSAP</i> |

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| NAME | LABEL | MAX # BYTES | TYPE | DESCRIPTION |
|-----------------------|-------|----------------|------|--|
| Landmark Address | LMK | 60 | AN | Landmark or Vanity address such as "One Rockefeller Plaza" |
| Also Rings At Address | ARA | 60 | AN | Secondary address for the Calling Party Number that rings at 2 locations. Not validated against the MSAG. <i>Footnote³</i> Not applicable to dual service. <i>This information MAY be displayed at the PSAP</i> |
| Customer Name/Service | NAM | 32 | AN | Subscriber name associated with the Calling Number. Preferred format for an individual customer name (not a business) is: Last, First and, optionally, a suffix which may be generation (Jr, III) and/or title (PhD, Esq, MD). Honorifics (Mr., Mrs., Ms.) SHOULD not be included as part of the name. Alternatively, in order to provide the telecommunicator with an additional signal to pay attention to both the x, y coordinates and the civic address (and/or where the individual customer name is not provided) and to provide other clarifying service type information in a standardized manner, the field MAY be used in a standard way by carriers, with specific standardized "Service Descriptions." See Sections 2.2 and 19 of this document. |

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| NAME | LABEL | MAX # BYTES | TYPE | DESCRIPTION |
|------------------|-------|----------------|------|--|
| Class of Service | CLS | 1 | AN | <div>Valid entries:</div> <div><div><div>1 = Residence</div><div>2 = Business</div><div>3 = Residence PBX</div><div>4 = Business PBX</div><div>5 = Centrex</div><div>6 = Coin 1 Way out</div><div>7 = Coin 2 Way</div><div>I = Wireless Phase II with Phase I Information</div><div>V = VoIP Services Default CoS</div><div>D = VoIP Business</div><div>F = Other Mobile</div><div>K = VoIP Enterprise Services – Centrex & PBX</div><div>T = Telematics</div></div><div><div>8 = Mobile</div><div>9 = Residence OPX</div><div>0 = Business OPX</div><div>A = Customer Owned Coin Telephone (COCT)</div><div>B = Not Available</div><div>G = Wireless Phase I</div><div>H = Wireless Phase II</div><div>C = VoIP Residence</div><div>E = VoIP Coin/Pay Phone</div><div>J = VoIP Nomadic</div><div>For all VoIP CoS see notes on page 13</div></div></div> <div><u>Footnote⁴</u></div> |

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| NAME | LABEL | MAX # BYTES | TYPE | DESCRIPTION |
|--------------------------------|-------|----------------|------|---|
| Type of Service | TYS | 1 | AN | Valid entries: 0 = Not FX nor Non-Published 1 = FX in 911 serving area 2 = FX outside 911 serving area 3 = Non-Published 4 = Non-Published FX in serving area 5 = Non-Published FX outside 911 serving area 8 = PSALI Published 9 = PSALI Non-Published |
| Exchange | EXC | 4 | AN | A defined area, served by one or more telephone Central Offices, within which a Local Exchange Carrier furnishes service. <i>Footnote 5</i> |
| Emergency Service Number (ESN) | ESN | 5 | AN | Emergency Service Number associated with the House Number and Street Name and Community Name. <i>Note: The Service Provider, providing the E9-1-1 Selective Routing will assign ESNs.</i> |
| Main Telephone Number | MTN | 10 | N | Ten-digit telephone number of the Main Billing Number associated with the Calling Party Number. Format: NPANXXXXXX <i>Footnote³</i> |

⁴ NA = not available – class of service for an ESCO failure

⁵ The Data Technical Committee strongly recommends that all processing edits be removed from this Label due to technological changes requiring improved data security measures.



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| NAME | LABEL | MAX # BYTES | TYPE | DESCRIPTION |
|---|-------|----------------|------|--|
| Call Back Number | CBN | 10 | AN | Telephone Number that can be dialed to reach a specific calling party. The call back number MUST be a dialable number and used as a backup if the displayed number cannot be reached. Used for both wireline and wireless calls. <i>Footnote³</i> |
| P-ANI | PNI | 10 | AN | Pseudo ANI or locally specific code identifying the receiving antenna for the wireless 9-1-1 call for routing purposes. |
| Order Number | ORD | 10 | AN | Service order number for the activity associated with this record. |
| Completion Date | CPD | 10 | N | Completion Date in format CCYY-MM-DD |
| County ID | COI | 5 | AN | County Identification code (usually the FIPS code). <i>Note: County Identification field is used to identify the county of call origination. The Committee recommends use of the FIPS code assigned to each county by the U S Census Bureau.</i> |
| Access Infrastructure Provider (Company ID 1) | CPF | 5 | AN | NENA registered Company Identification code for Service Provider providing the network access to the end user customer (wireline, wireless, IP, etc.). |
| Data Provider ID (Company ID 2) | CPS | 5 | AN | NENA registered Company Identification code for Service Provider/Reseller/Private Switch supplying ALI record source information. |
| Postal/Zip Code | ZIP | 10 | AN | Postal or Zip code. Format: NNNNN-NNNN or ANANAN Footnote 3 |
| Customer Code | CUS | 3 | AN | Code used to uniquely identify a wireline customer |



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| NAME | LABEL | MAX # BYTES | TYPE | DESCRIPTION |
|---|-------|----------------|------|--|
| Comments | CMT | 30 | AN | Optional notes, MAY be displayed at PSAP Telephone Number (TN) USERS on MLTS can include any pertinent information that will assist in reducing response time such as – contact security department, contact front desk, etc. <i>Footnote³</i> |
| TAR Code | TAR | 6 | AN | Taxing Area Rate Code |
| Alternate Telephone Number | ALT | 10 | N | Remote Call Forwarding number used during Interim Number Portability- NPANXXXXXX |
| Return Code Number | RCN | 3 | N | Code indicating specific processing error code or processing completed successfully. (MAY be used as many times as necessary.) Valid "x" entries: Not present (or 000 if used) = processing completed successfully XXX = Valid NENA Standard Error Code |
| Special Attention Indicator | SAI | 1 | AN | Calls that require special attention. Valid entries: 1 = TTY call 2 = ACN = Automatic crash/collision notification |
| Common Language Location Indicator (CLLI) | CLI | 11 | AN | CLLI code of the local loop central office for the 911 calling party. |
| General Use 1 | GU1 | 60 | AN | This field will be mutually used by data exchange partners to pass information not defined in previous fields. |



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| NAME | LABEL | MAX # BYTES | TYPE | DESCRIPTION |
|---------------|-------|----------------|------|---|
| General Use 2 | GU2 | 60 | AN | This field will be mutually used by data exchange partners to pass information not defined in previous fields. |
| General Use 3 | GU3 | 60 | AN | This field will be mutually used by data exchange partners to pass information not defined in previous fields. |
| General Use 4 | GU4 | 60 | AN | This field will be mutually used by data exchange partners to pass information not defined in previous fields. |
| General Use 5 | GU5 | 60 | AN | This field will be mutually used by data exchange partners to pass information not defined in previous fields. |
| General Use 6 | GU6 | 60 | AN | This field will be mutually used by data exchange partners to pass information not defined in previous fields. |
| General Use 7 | GU7 | 60 | AN | This field will be mutually used by data exchange partners to pass information not defined in previous fields. |
| General Use 8 | GU8 | 60 | AN | This field will be mutually used by data exchange partners to pass information not defined in previous fields. |
| Longitude | LON | 11 | N | Longitude/X coordinate. Right Justified; pad field with zeros or spaces to left of decimal degrees. +long: east of Greenwich; -long: west of Greenwich. When Phase II location cannot be provided, Phase I information SHOULD be reported, i.e., the cell site or sector where the call is received. (Can be used for wireline) Sample: +000.000000 , -000.000000 <u>Footnote³</u> |

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| NAME | LABEL | MAX # BYTES | TYPE | DESCRIPTION |
|--------------|-------|----------------|------|--|
| Latitude | LAT | 10 | N | Latitude/Y coordinate. Right Justified; pad field with zeros or spaces to left of decimal degrees. +lat: north of equator; -lat: south of equator. When Phase II location cannot be provided, Phase I information SHOULD be reported, i.e., the cell site or sector where the call is received. (Can be used for wireline) Sample: +00.000000 , -00.000000 <u>Footnote³</u> |
| Elevation | ELV | 6 | N | Elevation/Altitude indicated as height different from mean sea level (plus or minus), measured in meters. Right Justified; pad field with zeros or spaces. (This is not intended to include floor level or uncompensated barometric pressure.) Sample: +00000 , -00000 |
| Cell Site ID | CEL | 6 | AN | Identification number indicating a geographic region of cellular coverage. . When Phase II location cannot be provided, Phase I information SHOULD be reported, i.e., the cell site or sector where the call is received. |
| Sector ID | SEC | 2 | AN | Sub set/section of a cell. When Phase II location cannot be provided, Phase I information, i.e., the cell site or sector where the call is received SHOULD be reported. |

The items below do not require a "Label" only the symbol shown

| | | | | |
|-----------------|--|---|----|---|
| Field Separator | | 1 | AN | A "pipe" is to be utilized for the field separator (ASCII HEX-7C) |
|-----------------|--|---|----|---|

| | | | | |
|---------------------|----|---|----|---|
| End of record NL | NL | 1 | AN | The NEW LINE character is a single character that identifies the end of record in all cases for all records. (ASCII HEX-0A) |
|---------------------|----|---|----|---|

9.1.1 Data Record Format Example:

**DAT | FOC | CPN..... | HNO..... | PRD.. | STN..... | STS.... | MCN.....
 | STA.. | LOC..... | NAM..... | CLS. | TYS. | MT
 N..... | CPD..... | CPF..... | NL**

NOTE: If the field is not being used (I.E: "Street Suffix", "Post Directional", "Customer Code") then the label is not used. It is also not necessary for the labels to be in any particular order. Fields MAY be added to the record without changing the file format.

The Service Provider, providing E9-1-1 Selective Routing MUST provide the governmental entity with a list of ESNs available for assignment by MSAG development personnel.

10 VERSION 3.1 FORMAT FOR MSAG DATA EXCHANGE

| NAME | LABEL | MAX # BYTES | TYPE | DESCRIPTION |
|--------------------|-------|----------------|------|--|
| Record Type | MSG | 0 | | Indicates start of MSAG record (label only, no data follows) |
| Function of Change | FOC | 1 | A | Type of activity the record is being submitted for. Valid entries ⁶ : D = Delete I = Insert |
| Prefix Directional | PRD | 2 | AN | Leading street direction prefix – Valid “x” Entries: N S E W NE NW SE SW |
| Street Name | STN | 60 | AN | Valid service address of the Calling Party Number. |
| Street Suffix | STS | 4 | AN | Valid street abbreviation, as defined by the U S Postal Service Publication 28, Appendix C. (e.g. AVE) |
| Post Directional | POD | 2 | AN | Trailing street direction suffix. -Valid “x” entries: N S E W NE NW SE SW |

⁶ See Version 2.1 MSAG FOC for more details:

***Note: In this instance,** “PSAP ID” means “the Code identifying the PSAP associated with the assigned ESN,” which may be different than how “PSAP ID” is used in 18.5.2 and 18.5.4 of this document where the term means “the Code identifying the PSAP as listed in the FCC PSAP registry.”

Function of Change for MSAG options

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| NAME | LABEL | MAX # BYTES | TYPE | DESCRIPTION |
|--------------------------------|-------|----------------|------|--|
| Low Range | LOR | 10 | AN | The lowest house number that is included in this ESN definition |
| High Range | HIR | 10 | AN | The highest house number that is included in this ESN definition |
| MSAG Community Name | MCN | 32 | A | Valid service community name as defined by the MSAG |
| Postal Community Name | PCN | 32 | A | Valid service community name as defined by the U S Postal Service |
| State/Province | STA | 2 | A | Alpha U.S. state, Canadian province abbreviation i.e., TX (Texas), ON (Ontario) |
| Odd/Even | OEN | 1 | A | Valid "x" entries: O = Odd numbering only E = Even numbering only B = Both odd and even numbering |
| Emergency Service Number (ESN) | ESN | 5 | AN | Emergency Service Number associated with the House Number and Street Name and Community Name. <i>Note: The Service Provider, providing the E9-1-1 Selective Routing will assign ESNs.</i> |
| Completion Date | CPD | 10 | N | Completion date in format CCYY-MM-DD |



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| NAME | LABEL | MAX # BYTES | TYPE | DESCRIPTION |
|--------------------------|-------|----------------|------|---|
| PSAP ID | PSI | 4 | AN | Code identifying the PSAP associated with the assigned ESN (Note: In this instance, "PSAP ID" means "the Code identifying the PSAP associated with the assigned ESN," which may be different than how "PSAP ID" is used in 18.5.2 and 18.5.4 of this document where the term means "the Code identifying the PSAP as listed in the FCC PSAP registry.") |
| County ID | COI | 5 | AN | County Identification code (usually the FIPS code). <i>Note: County Identification field is used to identify the county of call origination. The Committee recommends use of the FIPS code assigned to each county by the U S Census Bureau.</i> |
| Exchange | EXC | 4 | AN | A defined area, served by one or more Telephone Central Offices, within which a Local Exchange Carrier furnishes service. |
| TAR Code | TAR | 6 | AN | Taxing Area Rate Code associated with this House Number range, Street Name and Community Name |
| E9-1-1 Control Office | SRT | 11 | AN | 9-1-1 Control Office CLLI |
| General Use 1 | GU1 | 60 | AN | This field will be mutually used by data exchange partners to pass information not defined in previous fields. |
| General Use 2 | GU2 | 60 | AN | This field will be mutually used by data exchange partners to pass information not defined in previous fields. |

The items below do not require a "Label" only the symbol shown

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| | | | | |
|-----------------|----|--|--|---|
| Field Separator | | | | A "pipe" is to be utilized for the field separator (ASCII HEX-7C) |
| End of record | NL | | | A NEW LINE character is a single character that identifies the end of record in all cases for all records. (ASCII HEX-0A) |

MSAG Record Format Example:

**MSG | FOC. | PRD.. | STN..... | STS.... | LOR..... | HIR..... | M
 CN..... | PCN..... | STA.. | OEN. | ESN.... | CPD.....
 . | EXC.... | SRT..... | GU1..... |
 NL**

NOTE: If the field is not being used (I.E: General Use) then the label is not used. It is also not necessary for the labels to be in any particular order. Fields MAY be added to the record without changing the file format.

11 VERSION 3.1 HEADER FORMAT FOR DATA EXCHANGE

| <u>NAME</u> | <u>LABEL</u> | <u>MAX # BYTES</u> | <u>TYPE</u> | <u>DATA DESCRIPTION</u> |
|-------------------|--------------|------------------------|-------------|---|
| Record Type | HDR | 0 | A | Indicates start of header record (label only, no data follows) |
| Record Identifier | TST | 3 | AN | Test Records Only |
| Extract Date | EXD | 10 | N | Year, Month, Day the data was processed, Format: CCYY-MM-DD |
| Company Name | CON | 50 | AN | Name of Company forwarding file |
| Cycle Counter | CYC | 9 | N | Sequential number, 1-999,999,999 |
| Record Count | REC | 9 | N | Number of records by record type in file, does not include Header and Trailer records |
| General Use | GEN | 20 | AN | Field to be utilized by sender/receiver companies to provide additional information |

The items below do not require a "Label" only the symbol shown

| | | | | |
|------------------|----|---|----|---|
| Field Separator | | 1 | AN | A "pipe" is to be utilized for the field separator (ASCII HEX-7C) |
| End of record NL | NL | 1 | AN | The NEW LINE character is a single character that identifies the end of record In all cases for all records. (ASCII HEX-0A) |

11.1.1 Header Record Format Example:

HDR | EXDCCYY-MM-DD | CON..... | CYC..... | REC..... | GEN..... | NL

NOTE: If the field is not being used (I.E: General Use) then the label is not used. It is also not necessary for the labels to be in any particular order, except for the Record

Type indicator, which MUST be first. Fields MAY be added to the record without changing the file format.

Header records will employ cycle counting to ensure a cycle of updates is not missed.

12 VERSION 3.1 TRAILER FORMAT FOR DATA EXCHANGE

| <u>NAME</u> | <u>LABEL</u> | <u>MAX # BYTES</u> | <u>TYPE</u> | <u>DATA DESCRIPTION</u> |
|--------------|--------------|------------------------|-------------|---|
| Record Type | TLR | 0 | A | Indicates start of Trailer record (label only, no data follows) |
| Record Count | REC | 9 | N | Number of records by record type in file, does not include Header and Trailer records |

The items below do not require a "Label" only the symbol shown

| | | | | |
|-----------------|----|---|----|--|
| Field Separator | | 1 | AN | A "pipe" is to be utilized for the field separator (ASCII HEX-7C) |
| End of record | NL | 1 | AN | A NEW LINE character identifies the end of record value in all cases for all records. (ASCII HEX-0A) |

TLR | REC..... | NL

NOTE: Fields MAY be added to the record without changing the file format, because a record consists of the data found between one new line and the next, labels need not follow in sequence though checking for duplicate labels within a single record would be prudent.

Trailer records will employ record counting to ensure a record within an update file is not missed.

13 VERSION 3.1 WIRELESS DATA EXCHANGE

13.1.1 Dynamic Updates of the ALI Database

The Version 1 through 4 Formats for Data Exchange applies to record and file exchanges between Service Providers and Data Base Management System Providers. These exchanges are file oriented and MAY be exchanged using bulk electronic file transmissions, CD-ROM, diskette, magnetic tape, or similar medium. The need to provide dynamic ALI database updates during 9-1-1 calls was introduced with Wireless Phase I solutions. The traditional record/file format for data exchange does not apply to dynamic database updates, which are real-time transaction, oriented. Header and Trailer records are not utilized in a transaction message, which is designed to be a real-time update of one or more database records.

Wireless solutions require information to be provided to the PSAP at the time a 9-1-1 call is in progress from a wireless device. This information is dynamic since it cannot be determined or stored in the ALI database prior to the 9-1-1 calls. Information such as the wireless caller's Call Back Number, Latitude, and Longitude information is only known at the time the 9-1-1 call is placed and may be dynamically populated in the ALI database. Wireless Service Providers may generate a real-time transaction to the ALI System that contains this dynamic information. The ALI database is updated with this information prior to the PSAP equipment issuing an ALI request (bid) to the ALI database. When the ALI system receives the request from the PSAP, the dynamically updated database record is retrieved and used to build the ALI source data that will be transmitted back to the PSAP, with the Call Back Number, Latitude, Longitude, and other dynamically updated information.

This dynamic update capability requires real-time interfaces to be developed between the data provider and the ALI Database Management System. Many of these interfaces are in place as Wireless Phase I solutions were deployed. These real-time interfaces may utilize proprietary software and data formats.

Wireless Phase II introduced the need to retrieve updated lat/long information during 911 call processing. Data Base Management System Providers SHOULD refer to TIA/EIA J-STD-036 and NENA 05-001 Standard for the Implementation of the Wireless Emergency Service Protocol E2 Interface. When implementing the E2 interface DBMS System Providers MUST ensure compatibility between the data elements defined in the E2 interface and the data elements defined in this NENA document. When inconsistencies exist between TIA/EIA J-STD-036 and the NENA E2 Interface Document, the NENA standards MUST take precedence. Position data retrieved from the MPC MAY need to be translated to conform to the ALI database and ALI source data formats.

NENA recognizes that existing interfaces may utilize these proprietary interfaces, protocol, and data formats. The Dynamic Update of the ALI Database shown in the XML format is for illustrative purposes. Each interface provider SHOULD review the data elements for dynamic updates for consideration in these proprietary interfaces. Adoption of XML data format for real-time interfaces may provide the same benefits recognized for record/file exchange. New data elements may need to be added to these real-time interfaces as new technology is introduced. New data elements can be easily added when using XML format.

The following are data elements for Dynamic Updates to the ALI Database. These same data elements SHOULD be defined in the ALI source data format used to transmit the ALI back to the PSAP.

| NAME | LABEL | MAX # BYTES | TYPE | DESCRIPTION |
|---------------------|-------|----------------|------|--|
| Call-Back Number | CBN | 10 | AN | Telephone Number that can be dialed to reach a specific calling party. The call back number MUST be a dialable number and used as a backup if the displayed number cannot be reached |
| MOBILE ID (MIN) | MIN | 10 | AN | Mobile Identification number of the cellular wireless device. |
| Roamer Port | RPT | 10 | AN | Temporarily assigned "roamer" call back number. |
| Channel | RCC | 3 | AN | Channel signal received on. |
| Longitude | LON | 11 | N | Longitude/X coordinate. Right Justified; pad field with zeros to left of decimal degrees. +long: east of Greenwich; -long: west of Greenwich. When Phase II location cannot be provided, Phase I information SHOULD be reported, i.e., the cell site or sector where the call is received. (Can be used for wireline) Sample: +000.##### |

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| NAME | LABEL | MAX # BYTES | TYPE | DESCRIPTION |
|---------------------|-------|----------------|------|--|
| Latitude | LAT | 10 | N | Latitude/Y coordinate. Right Justified; pad field with zeros to left of decimal degrees. +lat: north of equator; -lat: south of equator. When Phase II location cannot be provided, Phase I information SHOULD be reported, i.e., the cell site or sector where the call is received. (Can be used for wireline) Sample: +00.##### |
| Elevation | ELV | 5 | N | Elevation/Altitude/Z indicated as height different from mean sea level (plus or minus), measured in meters. (This is not intended to include floor level or uncompensated barometric pressure.) Sample: +000.### , -00.### |
| P-ANI | PNI | 10 | AN | Pseudo ANI or locally specific code identifying the receiving antenna for the wireless 9-1-1 call for routing purposes. |
| Location Valid Flag | LVD | 1 | N | Valid data indicator (1=OK; 0=Invalid). |
| Datum | NAD | 2 | AN | Specifies the map projection and coordinate system for the display of the Longitude and Latitude coordinates. Two systems are commonly used for North America. The code 83 identifies North American Datum for 1983 (NAD83). Code 84 identifies the World Geodetic System for 1984 (WGS 84). Other codes MAY be added as additional datum become available through authorized entities. Where x = 83 = NAD83 84 = WGS 84 |

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| NAME | LABEL | MAX # BYTES | TYPE | DESCRIPTION |
|---------------------------------|-------|----------------|------|---|
| LDT Confidence | COF | 7 | N | Information that indicates the level of uncertainty inherent to the associated latitude/longitude information expressed in meters, ranging from one meter to 1800 Km expressed in meters. |
| LDT Confidence Percentage | COP | 3 | N | Information identifying the confidence by which it is known that the calling party lies within the associated shape description. It is expressed as a percentage ranging from 0 – 100. |
| LDT Provider ID | LDT | 8 | AN | LDT Provider Identification Code. Codes to be developed and held by NENA. |



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| NAME | LABEL | MAX # BYTES | TYPE | DESCRIPTION |
|-------------------------|-------|----------------|------|---|
| LDT Technology | LTY | 2 | AN | <p>Defines how particular position information was obtained to help assess its credibility. Defined values include:</p> <p>Single Character Value of x: Translation Value of yyy.</p> <ul style="list-style-type: none"> 0 = Unknown 1 = Network Unspecified 2 = Network AOA 3 = Network TOA 4 = Network TDOA 5 = Network Radio Frequency (RF) Fingerprinting 6 = Network Cell Sector 16 = Handset Unspecified 17 = Handset GPS 18 = Handset A-GPS (Assisted GPS) 19 = Handset E-OTD (Enhanced Observed Time Difference) 20 = Handset AFLT (Advanced Forward Link Trilateration) |
| Time Stamp | TME | 8 | AN | Universal Time Coordinate (UTC) indicating milliseconds into UTC day. |
| Day Stamp | DAY | 7 | N | Year and Julian date. (UTC Date). Sample: 1996187 (CCYYDDD). |
| Speed (in KPH) | SPD | 3 | N | Speed of travel in kilometers per hour. |
| Heading (in degrees) | HDG | 3 | N | Direction of travel, decimal degrees from true north. Valid entries 0-359. |

| NAME | LABEL | MAX # BYTES | TYPE | DESCRIPTION |
|--------------|-------|----------------|------|---|
| Cell Site ID | CEL | 6 | AN | Identification number indicating a geographic region of cellular coverage. When Phase II location cannot be provided, Phase I information SHOULD be reported, i.e., the cell site or sector where the call is received. |
| Sector ID | SEC | 2 | AN | Sub set/section of a cell. . When Phase II location cannot be provided, Phase I information SHOULD be reported, i.e., the cell site or sector where the call is received. |

Wireless Data Format Example:

CBN..... | MIN..... | RPT..... | RCC... | XCD..... | YCD..... | ZCD..... | PNI
..... | LVD. | NDA.. | COF.... | COP.. | LDT..... | LTY.... | TME..... | DAY..... | SPD... |
HDG... | NL

NOTE: Version 4 Data Exchange Format is an industry standard XML data format. NENA XML (Extensible Markup Language) documents have been adapted from Standard Generalized Markup Language (SGML) by the World Wide Web Consortium. Version 4 Data Exchange Format was created to bring the NENA Data Exchange Format in line with industry standard implementation methods, to introduce versioning control and promote reusability of previous work. All existing NENA 4 information has been removed from this document and moved to an easily accessible area on the NENA web site.

http://www.nena.org/xml_schemas/. Go to this Uniform Resource Locator (URL) and select the **Current NENA XML Schemas**. All previous XML format exhibits are shown including Element Tags, GIS Data Model, and ALI Response V1.0.

XML ALI Exchange development SHOULD be done in accordance with the **NENA ALI Query Service Standard, [NENA-STA-029](#) (originally 04-005)**. The most current versions of the ALI and AQS schemas SHOULD be used.

14 VERSION 4 XML FORMAT FOR DATA EXCHANGE

14.1 The XML Schema

The XML Schema is a document that represents how the XML data SHOULD be organized. It defines the data elements that are needed and those that are optional. The schema also describes data types (Strings vs. integer data, date elements, etc.), the relationship between data elements (single or multiple instance, parent and child elements)

14.2 Schema Version Control

All NENA data exchange formats, prior to NENA 3, by nature, could not be changed without becoming a completely new data exchange format and were not backward compatible.

NENA 4 provides a vehicle to support necessary change without disturbing existing systems and processes. NENA 4 can be said to be *backward* compatible within schema generations.

A *Schema Generation* change is used to make major modifications to the XML Schema, changes that are so different that they will prevent the validation process. Schema from one Generation are not backward compatible and cannot be used to validate data documents. For example, changing the schema rules about how data elements are organized will often be the cause of backward incompatibility since this type of change would modify the definition, structure or existing relationships between data elements or groupings. Again, a new *Generation* will not be backward compatible with previous generations.

A *Schema Release* change is used to introduce modifications to an XML Schema that maintain backward compatibility with all other schema releases within the current generation.

Schema Generations will be kept in "Generation" named folders on the NENA Web site linked to the NENA Home Page, following W3C conventions, and will be available to anyone who requires the schema documents for validation or development. Under each Generation folder will be folder(s) that contain the most current as well as previous schema releases. Each Release folder will contain the actual schema files, all supporting documentation and Application Information Caption Map data.

14.3 Schema Design

In a simple schema design, the data element type definitions MAY be included within the schema itself. To promote reusability data type definitions have been separated into an *ALI Type Library* schema document. The *ALI Type Library* can be used or referenced by other applications or schemas to retrieve the data types defined for 911 ALI. When schema or data definition changes are needed the change will be made to a single reference file

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within a release instead of changing the individual schemas. When the change is made to the *ALI Type Library* schema the change is then available to all applications that reference it.

14.4 Schema Extensions

XML Schema Extensions provide a method to include additional data elements that have not yet been specifically defined in the ALI Library. Schema Extensions promote a data flexibility that was not available in previous NENA exchange formats. Once it has been determined that the new data element(s) provided through the extension mechanism are needed they will be added to the *ALI Type Library* or other schema documents, through the NENA Data Committee process. A new schema release will then be created which includes the new data elements

14.5 Schema Validation

Proper Schema validation provides a level of confidence that the data being sent to and received by an application meets the established definition and requirements for the defined XML data. Previous NENA data exchange versions defined the arrangement of data elements in a fixed length record. The XML Schema describes the layout of an XML *document*. Validation checks the element tag names, the needed tags and data are present, the order of data elements in the XML document, and the data type of each element to ensure they fit the definition and meet the requirements as specified in the Schema. Each XML data document includes information that specifies the Schema Generation and *Release* used to validate the XML document from which it was issued. This Schema *Generation* and *Release* information is included in the XML documents *Root Element* at the beginning of the XML document.

14.6 Validation Point

The purpose of the XML schema is to provide a means to determine that an XML document is complete and valid as to its format, structure and data element types. The most logical point in the data exchange for validation to occur is at the sending application. Performing validation at the sending end ensures that only valid XML documents are received reducing retransmissions and effort on the receiving end to return the document to the sender. An alternative method is to validate on both ends where there is either a lack of confidence in the sender validation process or where the developer of the software wants to leverage the power of the schema.

14.7 Redefining of Data Elements

With a careful review of the original NENA 4 data elements it becomes apparent that the NENA 3 data elements were wrapped in an XML tag and called NENA 4 causing the real

benefits available with XML to be missed. For this reason the current NENA 3 and NENA 4 data elements have been reexamined to determine areas where improvements could be made. Details regarding additions, changes or modifications can be found in README files located within the *Generation/Release* folders on the NENA web site.

14.8 Two examples of this redefining are described below.

General Use

The original NENA 4 data exchange document identifies eight (8) text elements labeled *General Use* 1 thru 8, each 60 characters in length. During the review of schema definition these 8 data elements were removed and replaced with 1 element called *General Use*. The definition of this element says that there can be 1 or many of this general use element. In this way the XML document can, without changing *Generation* or *Release* include 1 *General Use* data element or 20. This is similar to adding rows or columns to a table in a word processor or adding a column in spreadsheet program. A new column or row can be added by creating an additional instance or occurrence of the data element. In a similar manner additional *General Use* fields can be added in the XML document without changing the schema or the definitions.

Class and Type of Service

The original NENA 4 definitions for Class and Type of Service contain a 2 dimensional data element for each Class and Type of Service The first part being the numeric representation such as 1, 2, 3, etc. The second part is a text definition of the number such as, 1= Residence, 2=Business, etc. The purpose was to make the standard text definition available for display at the PSAP. In the NENA 4 XML Schema document these definitions become part of the *ALI Type Library* schema and are, therefore, available to those applications that require it by using the schema as a cross reference to the definitions. This technique maintains the use of standard definitions, promotes reusability of data across many applications and schemas. This can also reduce the size of the data stream by not passing the definitions along with the data.

14.9 Transmission Protocol

The future direction of data exchange methods adopted by NENA should incorporate method and design concepts that are independent of traditional connection protocols. Among the benefits of XML data is the ability to be protocol independent. For example the current ALI source data delivery method utilizes a Start of Text /End of Text (STX/ETX) protocol wrapped around the ALI source data or other message. While this protocol works well in the legacy E9-1-1 environment there are benefits to be gained from more modern, faster data delivery methods and protocols such as Transmission Control Protocol/Internet

Protocol (TCP/IP), Hypertext Transfer Protocol (HTTP), Hypertext Transfer Protocol Secure (HTTPS), Simple Object Access Protocol (SOAP or others).

This becomes more apparent as the additional data available from Wireless, ACN and other sources we have not yet identified are considered. Since XML is protocol independent it MAY be used within the existing infrastructure without limiting the possibility of using other protocols to deliver the ALI source data or other data messages.

14.10 XML Schema Location

NENA Version 4 Data Exchange Formats are available on the NENA web site at http://www.nena.org/XML_Schemas.

The most current *Generation* and *Release* XML schemas and supporting documentation are available at this location.

Schema documents for all XML data sources will be coordinated and validated by the NENA Data Technical Committee.

A Schema Generation identifies XML families of schemas that are backward compatible within that family or generation.

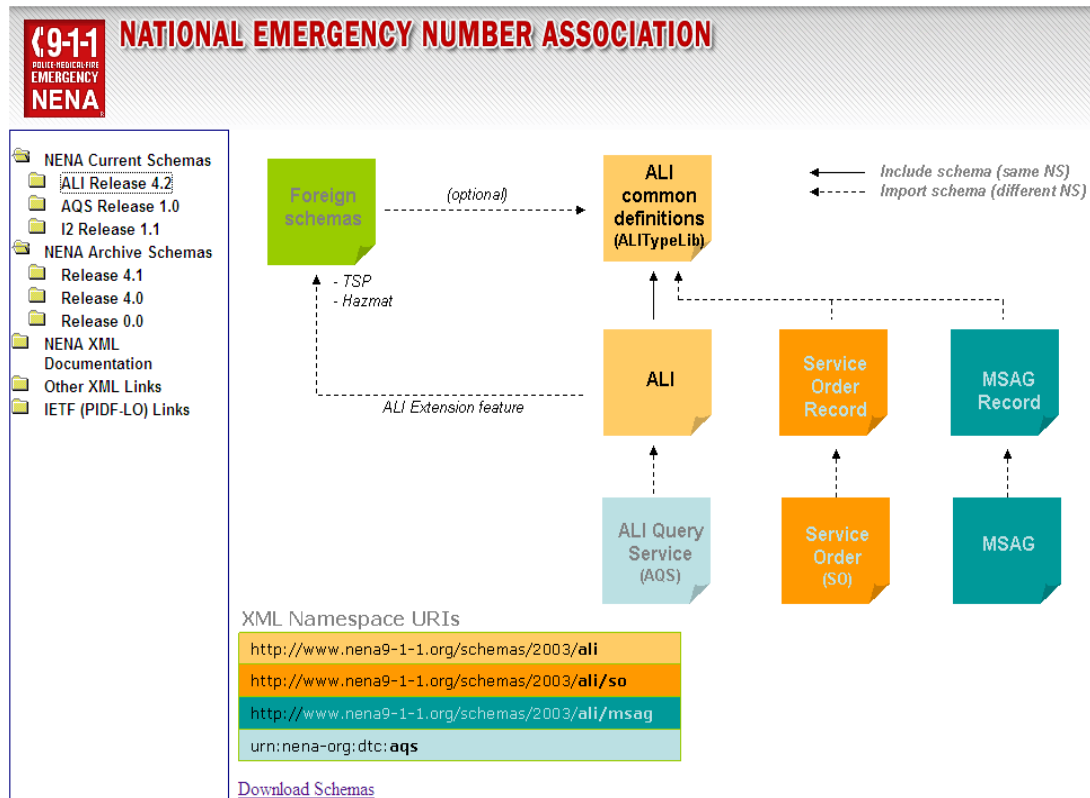
A Schema Release is a grouping of schema documents for each XML data source such as ACN, Service Order, MSAG, etc.

There may be many releases within a Schema Generation. The differences between releases are such that they do not cause incompatibility with previous releases within that Generation schema family.

Schema changes that cause backward incompatibility constitute a new Generation.

Some schema documents may not change between a Generation or Release; however, all files in each release within each generation will have been verified to ensure compatibility with all other schemas within that release. Once this has been accomplished the collection of schemas will be organized into a Release, assigned a number designating the Generation family it belongs to and its order within that Generation family and then place on the NENA web site for use. An example of the Release naming convention would be *Release 1.2* for Generation 1, Release 2 designating the second release of XML schemas within Generation 1. The next release within Generation 1 would be *Release 1.3* and so on.

14.11 Example of the relationship between schema Generations and subsequent Releases



Schema Version 4.2

Change Log

These are the items that have been changed from Version 4.1 to 4.2 in the schemas.

14.12 All schemas:

- 1) Changed all instances of datatypes (and restrictions) `xs:string` to `xs:token`⁷.
- 2) Set version in all schemas to 4.2.

⁷ An *xs:token* string is a string that does not contain the carriage return (`#xD`), line feed (`#xA`) nor tab (`#x9`) characters, that has no leading or trailing spaces (`#x20`) and that has no internal sequences of two or more spaces

15 ALI Schemas

15.1 ALI.xsd

- 1) Removed LocationInfo root element.
- 2) Removed MaxOccurs unbounded from LocationInfo occurring in AliBody.
- 3) Added Best Practices documentation for CallInfoType.
- 4) Modified CallInfoType so that all child elements are optional; specific change is that CallingPartyNum and ClassOfService are now optional.
- 5) Added the following optional element to the ALI schema *CallInfoType* definition:
CallInfo/SpecialMessage : SpecialMessageType.
- 6) Added the following optional element to the ALI schema *CallInfoType* definition:
CallInfo/AlsoRingsAtAddress : TextualCivicAddressType
- 7) Removed use attribute in LocationInfoType.
- 8) Added Best Practices documentation for AgenciesType.
- 9) Replaced individual Law/Fire/EMS types with Agency Type definition.
- 10) Added ability to specify multiple OtherAgencies.
- 11) Modified ESN to be an optional element in Agencies.
- 12) Modified SourceInfoType to make DataProvider, Access Provider, ALIRetrievalGMT optional elements.
- 13) Modified NetworkInfo to make PSAPID and RouterID optional elements.
- 14) Added PSAPName as element for NetworkInfo.

15.2 ALITypeLib.xsd

- 1) Modified AdditionalAgencyInfoType size to be 75 rather than 100 chars.
- 2) Added AgencyType definition which contains AgencyName and AgencyTN.
- 3) Removed AlsoRingsAtAddressType.
- 4) Modified CellID and SectorID to be optional elements for CellSiteType; added Best Practices documentation.
- 5) Add length specifier of 1 to ClassOfServiceCodeType.
- 6) Added length specifier to CountryType

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- 7) Added Name as optional element in DataProviderIDType.
- 8) Added length specifier of 2 to DatumType.
- 9) Added Name as optional element in AccessProviderIDType.
- 10) Removed EMSType, FireType, LawType (superseded by AgencyType).
- 11) Added length specifier to LDTTechnologyCodeType.
- 12) Removed LocationValidType.
- 13) Added PSAPNameType.
- 14) Removed RoamerPortType.
- 15) Added length specifier to SourceOfServiceType (this is an optional field in Call Info).
- 16) Added length specifier to SpecialAttentionIndicator.
- 17) Added SpecialMessageType.
- 18) Added Best Practices documentation for StreetAddressType.
- 19) Made all elements in StreetAddressType optional.
- 20) Added the following optional element to *StreetAddressType* definition: *TextualAddress* : TextualCivicAddressType. (Even though this may seem redundant with the *LocationDescription* element, the latter is defined to hold additional information about a location (for example "South Wing") rather than the civic address of the location itself. The *TextualAddress* element is there to explicitly support cases where street address is available only in textual (un-structured) form – like the address of a VoIP caller in i2.)
- 21) Added TextualCivicAddressType.
- 22) Added length specifier to TypeOfServiceCodeType.

15.3 ALI Query Service Directory and Schemas

The "aliqs" directory contains schemas and Web Service Description Language (WSDL) for ALI Query Service. These are all new.

15.4 AQS and AQS.WS Removed

Directories containing preliminary work on AQS have been removed.

15.5 MSAGRecord.xsd

- 1) Removed RangeNumberType.

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- 2) Modified LowRange and HIghRange to be HouseNumTypes.
- 3) Modified Function of Change to be consistent with decisions made for NENA 2.1 retrofit. The only FOC types supported are "D" and "I".
- 4) Moved TARCode from the street element to the range element.

16 I2 Schemas

16.1 Geopriv Directory and Schemas

The geopriv directory contains the CivicAddress and geoshape schemas.

16.2 GML-3.1.1 Directory and Schemas

The GML directory contains GML schemas referenced from the v9 schemas.

16.3 All I2 Schemas

| Old | New |
|------------------------|----------------------|
| V2-request | v2Request |
| v2-response | v2Response |
| v2-esct | v2Esct |
| v2-esct-ack | v2EsctAck |
| callserver-vpc-request | callserverVpcRequest |
| callserver-vpc-esct | callserverVpcEsct |
| esr-request | esrRequest |
| call-id | callId |
| call-origin | callOrigin |
| esr-response | esrResponse |
| esct-ack | esctAck |
| v3-request | v3Request |
| v3-response | v3Response |
| vpc-lis-request | vpcLisRequest |
| ipl-request | iplRequest |

| | |
|-----------------------|---------------------|
| message-id | messageId |
| ipl-response | iplResponse |
| pos-source | posSource |
| v8-request | v8Request |
| v8-response | v8Response |
| vpc-erdb-request | vpcErdbRequest |
| erdb-request | erdbRequest |
| erdb-response | erdbResponse |
| v9-request | v9Request |
| v9-response | v9Response |
| vdb-identity-request | vdbIdentityRequest |
| erdb-identity-request | erdbIdentityRequest |
| identity-request | identityRequest |
| identity-response | identityResponse |
| location-key | locationKey |
| na-na-id | na-naID |
| organization-name | organizationName |
| cert-uri | certUri |
| location-key | locationKey |

Added version attribute to the schema element.

16.4 V2.xsd

- 1) Modified result element to be String with numeric restriction.

16.5 V7.xsd

- 1) Removed pidf import
- 2) Added return 500, 570, 580 to ReturnCodeType

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16.6 V8.xsd

- 1) Removed pidf import
- 2) Added return 210, 211, 212, 213, 214, 215, 562 to ReturnCodeType
- 3) Modified geo-location to be consistent with V9.

16.7 V9.xsd

This schema has been completely re-written.

17 GIS DATA MODEL, VERSION 2.0

17.1 Preface

Version 2.0 of the NENA GIS Data Model identifies the minimal attributes needed in a spatial dataset. It also defines the GML schema that can be used with this model. Using the GML schema, this data model can be used for GIS data exchange between neighboring public safety agencies and to meet the requirements of GIS data needed for the NENA i2 solution (NENA 08-001).

Note: This data model is NOT compliant with Civic Location Data Exchange Format (CLDXF) (NENA-STA-004) and does not meet the GIS requirements for the NENA i3 solution (NENA-STA-010). As of the publication of this document, the NENA NG9-1-1 GIS Data Model (NENA-STA-006) has been developed and is undergoing Public Review as of the most recent revision of this document. It is recognized that this Version 2.0 may have become somewhat unclear on some aspects and may be different than or inconsistent with what may be expected to be adopted in the NENA NG9-1-1 GIS Data Model (NENA-STA-006). However, because Version 2.0 is expected to be essentially substantively superfluous prospectively once the NENA NG 9-1-1 GIS Data Model (NENA-STA-006) has been adopted, no attempt has been made to update Version 2.0 to provide any additional or increased substantive clarity or to reconcile Version 2.0 with what is expected to be adopted in the NENA NG9-1-1 GIS Data Model ((NENA-STA-006) although a couple of non-substantive typographical errors in Version 2.0 were corrected).

17.2 Metadata

The Content Standard for Digital Geospatial Metadata (CSDGM), Vers. 2 ([FGDC-STD-001-1998](#)) is the US Federal Metadata standard. The Federal Geographic Data Committee originally adopted the CSDGM in 1994 and revised it in 1998. According to Executive Order 12096 all Federal agencies are ordered to use this standard to document geospatial data created as of January, 1995. The standard is often referred to as the FGDC Metadata Standard and has been implemented beyond the federal level with State and local governments adopting the metadata standard as well.

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The international community, through the International Organization of Standards (ISO), has developed and approved an international metadata standard, ISO 19115. As a member of ISO, the US is required to revise the CSDGM in accord with ISO 19115. Each nation can craft their own profile of ISO 19115 with the requirement that it include the 13 core elements. The FGDC is currently leading the development of a US Profile of the (ISO) international metadata standard, ISO 19115.

Metadata is information about the content, quality, condition, and other characteristics of data being sent. The basic elements to be included in the metadata file are taken from the *2003 ISO 19115 – International Standard for Geographic Information – Metadata*.

This International Standard defines an extensive set of metadata elements; typically only a subset of the full number of elements is used. However, it is essential that a basic minimum number of metadata elements be maintained for a dataset. Listed are the core metadata elements required to identify a dataset, typically for catalogue purposes. This list contains metadata elements answering the following questions: "Does a dataset on a specific topic exist ('what')?", "For a specific place ('where')?", "For a specific date or period ('when')?" and "A point of contact to learn more about or order the dataset ('who')?". Using the recommended optional elements in addition to the mandatory elements will increase interoperability, allowing users to understand without ambiguity the geographic data and the related metadata provided by either the producer or the distributor. Dataset metadata profiles of this International Standard MAY include this core.

Listed below are the core metadata elements (mandatory and recommended optional) REQUIRED for describing a dataset. An "M" indicates that the element is MANDATORY. An "O" indicates that the element is OPTIONAL. A "C" indicates that the element is MANDATORY under certain conditions.

| | |
|---|--|
| Dataset title (M) (MD_Metadata > MD_DataIdentification.citation > CI_Citation.title) | Spatial representation type (O) (MD_Metadata > MD_DataIdentification.spatialRepresentationType) |
| Dataset reference date (M) (MD_Metadata > MD_DataIdentification.citation > CI_Citation.date) Reference system (O) | Reference system (O) (MD_Metadata > MD_ReferenceSystem) |
| Dataset responsible party (O) | Lineage (O) |

| | |
|---|--|
| (MD_Metadata > MD_DataIdentification.pointOfContact > CI_ResponsibleParty) | (MD_Metadata > DQ_DataQuality.lineage > LI_Lineage) |
| Geographic location of the dataset (by four coordinates or by geographic identifier) (C) (MD_Metadata > MD_DataIdentification.extent > EX_Extent > EX_GeographicExtent > EX_GeographicBoundingBox or EX_GeographicDescription) | On-line resource (O) (MD_Metadata > MD_Distribution > MD_DigitalTransferOption.onLine > CI_OnlineResource) |
| Dataset language (M) (MD_Metadata > MD_DataIdentification.language) | Metadata file identifier (O) (MD_Metadata.fileIdentifier) |
| Dataset character set (C) (MD_Metadata > MD_DataIdentification.characterSet) | Metadata standard name (O) (MD_Metadata.metadataStandardName) |
| Dataset topic category (M) (MD_Metadata > MD_DataIdentification.topicCategory) | Metadata standard version (O) (MD_Metadata.metadataStandardVersion) |
| Spatial resolution of the dataset (O) (MD_Metadata > MD_DataIdentification.spatialResolutio n > MD_Resolution.equivalentScale or MD_Resolution.distance) | Metadata language (C) (MD_Metadata.language) |
| Abstract describing the dataset (M) | Metadata character set (C) (MD_Metadata.characterSet) |

| | |
|---|---|
| (MD_Metadata > MD_DataIdentification.abstract) | |
| Distribution format (O) (MD_Metadata > MD_Distribution > MD_Format.name and MD_Format.version) | Metadata point of contact (M) (MD_Metadata.contact > CI_ResponsibleParty) |
| Additional extent information for the dataset (vertical and temporal) (O) (MD_Metadata > MD_DataIdentification.extent > EX_Extent > EX_TemporalExtent or EX_VerticalExtent) | Metadata date stamp (M) (MD_Metadata.dateStamp) |

17.3 9-1-1 SPATIAL ATTRIBUTES FOR LINE DATA

17.3.1 Centerline Layer (REQUIRED)

| <u>ATTRIBUTE NAME</u> | <u>USE R/O</u> | <u>TYPE</u> | <u>DATA DESCRIPTION</u> |
|------------------------------|-----------------------|--------------------|---|
| Low Address Left | R | N | Lowest address on left side of street in ascending order |
| High Address Left | R | N | Highest address on left side of street in ascending order |
| Low Address Right | R | N | Lowest address on right side of street in ascending order |
| High Address Right | R | N | Highest address on right side of street in ascending order |
| Prefix Directional | R | A | Leading street direction prefix. Valid Entries: N S E W NE NW SE SW |
| Street Name | O | A | The element of the complete street name preceding the street name element that indicates the type of |

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| <u>ATTRIBUTE NAME</u> | <u>USE R/O</u> | <u>TYPE</u> | <u>DATA DESCRIPTION</u> |
|----------------------------------|---------------------------|--------------------|--|
| Pre Type | | | street. These are typically Street Suffixes according to Appendix C in United States Postal Service (USPS) Publication 28. However, they are not abbreviated when used in this field. |
| Street Name | R | AN | Valid street name as assigned by local addressing authority |
| Street Suffix | R | A | Valid Street abbreviation, as defined by the US Postal Service Publication 28. (e.g. AVE) |
| Post Directional | R | A | Trailing street direction suffix. Valid Entries: N S E W NE NW SE SW |
| Road Class | R | N | http://www.fhwa.dot.gov/planning/processes/statewide/related/highway_functional_classifications/section03.cfm#Toc336872980 Highway Performance Monitoring System (HPMS) Functional Classifications: 1= Interstate 2= Other Freeways and Expressways 3= Other Principal Arterial 4= Minor Arterial 5= Major Collector 6= Minor Collector 7= Local Not designated as a HPMS Functional Classification, but non the less an important road classification for 9-1-1: 8= Trails (Recreational trails) |
| One-way | R | A | One way road classification. The direction of the line |



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| <u>ATTRIBUTE NAME</u> | <u>USE R/O</u> | <u>TYPE</u> | <u>DATA DESCRIPTION</u> |
|----------------------------------|---------------------------|--------------------|--|
| | | | <p>is an internal attribute maintained by the GIS database. The direction of the line can be displayed by symbolizing the beginning (FROM) node and the ending (TO) node of the street centerline. The direction of the street centerline SHOULD be FROM the lowest address range TO the highest address range</p> <p>B or Blank – travel in both directions allowed</p> <p>FT – One-way from FROM node to TO node (in direction of arc)</p> <p>TF – One way from TO node to FROM Node (opposite direction of arc)</p> |
| Postal Community Name Left | R | A | Postal Community Name as identified on the left side of the street |
| Postal Community Name Right | R | A | Postal Community Name as identified on the right side of the street |
| Postal Code/Zip Code Left | R | AN | Postal or Zip code as identified on the Left side of the street. Format: ANANAN or NNNNN ² |
| Postal Code/Zip Code Right | R | AN | Postal or Zip code as identified on the Right side of the street. Format: ANANAN or NNNNN ² |
| MSAG Community Name Left | R | A | Valid service community name as identified by the MSAG on the left side of the street |
| MSAG Community Name Right | R | A | Valid service community name as identified by the MSAG on the right side of the street |
| ESN Left | O | AN | 3-5 digit Emergency Service Number associated with street segment |



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| <u>ATTRIBUTE NAME</u> | <u>USE R/O</u> | <u>TYPE</u> | <u>DATA DESCRIPTION</u> |
|----------------------------------|---------------------------|--------------------|---|
| ESN Right | O | AN | 3-5 digit Emergency Service Number associated with street segment |
| Segment ID | R | N | Unique Road Segment ID number |
| County Name Left | R | AN | County Name on the Left side of the street as given in FIPS 6-4 ¹ |
| County Name Right | R | AN | County Name on the Right side of the street as given in FIPS 6-4 ¹ |
| County Code Left | R | A | County Code on the Left side of the street as given in FIPS 6-4 ¹ |
| County Code Right | R | A | County Code on the Right side of the street as given in FIPS 6-4 ¹ |
| State/Province Left | R | A | Two character Alpha U.S. State or Canadian province abbreviation as defined by Postal Authority or ISO 3166-2 i.e. TX (Texas), ON (Ontario) |
| State/Province Right | R | A | Two character Alpha U.S. State or Canadian province abbreviation as defined by Postal Authority or ISO 3166-2 i.e. TX (Texas), ON (Ontario) |
| Source of Data | R | A | Agency that last updated the record |
| Date Updated | R | N | Date of last update Format: CCYY-MM-DD |

¹ <http://www.census.gov/geo/reference/ansi.html> The FIPS Codes Standard SHALL not apply to applications involving interchange of international data that require the use of the
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country codes of the International Organization for Standardization, i.e., ISO 3166. For the convenience of such users, the ISO 3166 country codes are published in FIPS PUB 104, *Guideline for Implementation of ANSI Codes for the Representation of Names of Countries, Dependencies, and Areas of Special Sovereignty*. FIPS PUB 104 provides both two- and three-character alphabetic codes for each entity listed. Federal agencies that do not require FIPS PUB 104 for international data interchange, and are not involved in national defense programs or with the mission of the U.S. Department of State, may adopt either set of codes.

² The USPS considers zip codes to be delivery routes instead of areas. There may be differences between this depiction and actual zip code mailing address.

17.3.2 Railroad Layer (Optional)

| <u>ATTRIBUTE NAME</u> | <u>USE R/O</u> | <u>TYPE</u> | <u>DATA DESCRIPTION</u> |
|----------------------------------|---------------------------|--------------------|---|
| Line | R | A | Railroad Line Owner (Code of Association of American Railroads) |
| Line Sub-Division Name | R | A | Railroad Line Sub-Division Name |
| Line Type | R | A | Main, Secondary or Siding |
| Line Status | R | A | Active or Inactive |
| Segment ID | R | N | Unique Railroad Segment ID |
| Mile Post Low | R | AN | Beginning Linear Reference |
| Mile Post High | R | AN | Ending Linear Reference |
| Passenger Rail Indicator | R | A | Passenger Rail Indicator |
| Source of Data | R | A | Agency that last updated the record |
| Date Updated | R | N | Date of last update Format: CCYY-MM-DD |

17.3.3 Hydrology Layer (Optional)

| <u>ATTRIBUTE NAME</u> | <u>USE R/O</u> | <u>TYPE</u> | <u>DATA DESCRIPTION</u> |
|------------------------------|---------------------------|--------------------|---|
| Surface Water Type | R | A | Type of Surface Water (river, stream, etc.) |
| Surface Water Name | R | A | Name of river, stream etc. |
| Segment ID | R | N | Unique Hydrology Segment ID |
| Source of Data | R | A | Agency that last updated the record |
| Date Updated | R | N | Date of last update Format: CCYY-MM-DD |

17.4 9-1-1 SPATIAL ATTRIBUTES FOR POINT DATA

17.4.1 Emergency Service Agency Location Layer (REQUIRED)

| <u>ATTRIBUTE NAME</u> | <u>USE R/O</u> | <u>TYPE</u> | <u>DATA DESCRIPTION</u> |
|------------------------------|---------------------------|--------------------|---|
| Agency Type | R | A | Law = L Fire = F Emergency Medical Service = E Other = O |
| County Name | R | AN | County Name as given in FIPS 6-4 ¹ |
| County Code | R | A | FIPS County Code as given in FIPS 6-4 ¹ |
| Community | R | N | Unique Community ID Number i.e. FIPS, |

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| | | | |
|----------------------|---|----|--|
| ID | | | GEOCODES, etc. |
| Agency ID | R | N | Emergency Service Agency ID defined with the first 5 digits as the County ID code and the last 4 digits as the locally assigned agency code |
| Agency Name | R | A | Name of Agency |
| Agency Contact | R | A | Agency Contact Person |
| House Number Prefix | R | AN | House Number Prefix to accommodate Alphanumeric characters or fire numbers in house number i.e. Wisconsin |
| House Number | R | N | House Number |
| House Number Suffix | R | AN | House Number Suffix |
| Prefix Directional | R | A | Leading street direction prefix. Valid Entries: N S E W NE NW SE SW |
| Street Name Pre Type | O | A | The element of the complete street name preceding the street name element that indicates the type of street. These are typically Street Suffixes according to Appendix C in USPS Publication 28. However, they are not abbreviated when used in this field. |
| Street Name | R | AN | Valid street name as assigned by local addressing authority |
| Street Suffix | R | AN | Valid Street abbreviation, as defined by the US Postal Service Publication 28. (e.g. AVE) |
| Post Directional | R | A | Trailing street direction suffix. Valid Entries: N S E W NE NW SE SW |
| Postal Community | R | A | Postal Community Name |



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| | | | |
|----------------------|---|----|---|
| Name | | | |
| MSAG Community Name | R | A | Valid service community name as identified by the MSAG |
| Postal Code/Zip Code | O | AN | Postal or Zip code. Format: NNNNN or ANANAN ² |
| State/Province | R | A | Two character Alpha U.S. State or Canadian province abbreviation as defined by Postal Authority or ISO 3166-2 i.e. TX (Texas), ON (Ontario) |
| Telephone Number | O | AN | Telephone Number of Agency Format: NPA-NXX-XXXX |
| Source of Data | R | A | Agency that last updated the record |
| Date Updated | R | N | Date of last update Format: CCYY-MM-DD |

17.4.2 Cell Site Location Layer (REQUIRED)

| <u>ATTRIBUTE NAME</u> | <u>USE R/O</u> | <u>TYPE</u> | <u>DATA DESCRIPTION</u> |
|------------------------------|-----------------------|--------------------|--|
| NENA CO ID | R | AN | NENA Company ID http://www.nena.org/default.asp?page=CID2014 |
| Numeric Cell ID | R | N | Carrier Cell site ID |
| Cell Site Common Name | R | A | Location Name assigned by the wireless carrier |
| Cell Site Unique ID | R | AN | Cell Site Identifier provided by the wireless service provider, it is unique to the cell site |
| Cell Site Address | R | A | The address of the cell tower as provided by the wireless service provider. Needs to be MSAG |



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| | | | |
|--------------------------|---|----|--|
| | | | Valid |
| Postal Community Name | R | A | Postal Community Name |
| MSAG Community Name | R | A | Valid service community name as identified by the MSAG |
| Cell Site State | R | A | State where the cell tower is located |
| County Code | R | AN | FIPS County Code as given in FIPS 6-4 ¹ |
| Air Interface Technology | R | A | A=Analog (900MHz), P=Digital (PCS), T=TDMA (Digital AMPs), G=GSM – Type of RF Voice Technology |
| Source of Data | R | A | Agency that last updated the record |
| Date Updated | R | N | Date of last update Format: CCYY-MM-DD |

17.4.3 Mile Marker Location Layer (Optional)

| <u>ATTRIBUTE NAME</u> | <u>USE R/O</u> | <u>TYPE</u> | <u>DATA DESCRIPTION</u> |
|------------------------------|-----------------------|--------------------|---|
| Mile Post ID | R | N | Mile Post Identification Number |
| Mile Marker Type | R | A | Type of mile marker : Railroad name Road name Trail Water Way Coastal Boardwalk |
| Route System | R | AN | Name of route system (ex: Interstate 85) |



| | | | |
|----------------|---|---|---|
| Name | | | |
| Segment ID | R | N | Unique Road or Railroad Segment ID number |
| Source of Data | R | A | Agency that last updated the record |
| Date Updated | R | N | Date of last update Format: CCYY-MM-DD |

17.4.4 Railroad Grade Crossing Layer (Optional)

| ATTRIBUTE NAME | USE R/O | TYPE | <u>DATA DESCRIPTION</u> |
|-----------------------|----------------|-------------|---|
| Grade Crossing ID | R | N | Unique United States Department of Transportation (USDOT) ID for the Crossing |
| Crossing Position | R | AN | Position of Crossing At Grade Railroad (RR) Under RR Over |
| Grade Crossing Name | O | A | Name given to Grade Crossing |
| Source of Data | R | A | Agency that last updated the record |
| Date Updated | R | N | Date of last update Format: CCYY-MM-DD |

17.4.5 Site/Structure Location Layer (Optional)

| <u>ATTRIBUTE NAME</u> | <u>USE R/O</u> | <u>TYPE</u> | <u>DATA DESCRIPTION</u> |
|------------------------------|-----------------------|--------------------|---|
| Community ID | R | N | Unique Community ID Number i.e. FIPS, GEOCODES, etc. |
| Site ID | R | N | Unique Site ID Number |
| House Number | R | AN | House Number Prefix to accommodate Alphanumeric characters or fire numbers in |

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| | | | |
|-----------------------|---|----|--|
| Prefix | | | house number i.e. Wisconsin |
| House Number | R | N | House Number |
| House Number Suffix | R | AN | House Number Suffix |
| Location | O | AN | Additional location information. Abbreviated as shown in USPS Publication 28, Appendix C, Item C2. |
| Prefix Directional | R | AN | Leading street direction prefix. Valid Entries: N S E W NE NW SE SW |
| Street Name Pre Type | O | A | The element of the complete street name preceding the street name element that indicates the type of street. These are typically Street Suffixes according to Appendix C in USPS Publication 28. However, they are not abbreviated when used in this field. |
| Street Name | R | AN | Valid street name as assigned by local addressing authority |
| Street Suffix | R | AN | Valid Street abbreviation, as defined by the US Postal Service Publication 28. (e.g. AVE) |
| Post Directional | R | AN | Trailing street direction suffix. Valid Entries: N S E W NE NW SE SW |
| ESN | R | AN | Emergency Service Number associated with this House Number, Street Name and Community Name |
| Postal Community Name | R | A | Postal Community Name |
| MSAG Community | R | A | Valid service community name as identified by the MSAG |



| | | | |
|----------------------|---|----|--|
| Name | | | |
| Postal Code/Zip Code | O | AN | Postal or Zip code. Format: NNNNN or ANANAN ² |
| Landmark | R | AN | Landmark or Vanity address |
| Site Type | R | A | Type of Structure – Classification Field |
| L/R | R | A | Left/Right side of the road |
| Source of Data | R | A | Agency that last updated the record |
| Date Updated | R | N | Date of last update Format: CCYYMMDD |

17.5 9-1-1 SPATIAL ATTRIBUTES FOR POLYGON DATA

17.5.1 County Boundary Layer (REQUIRED)

| <u>ATTRIBUTE NAME</u> | <u>USE R/O</u> | <u>TYPE</u> | <u>DATA DESCRIPTION</u> |
|------------------------------|-----------------------|--------------------|--|
| County Name | R | AN | County Name as given in FIPS 6-4 ¹ |
| County Code | R | N | FIPS County Code as given in FIPS 6-4 ¹ |
| Source of Data | R | A | Agency that last updated the record |
| Date Updated | R | N | Date of last update Format: CCYY-MM-DD |

17.5.2 Emergency Service Zone Boundary Layer (REQUIRED)

| <u>ATTRIBUTE NAME</u> | <u>USE R/O</u> | <u>TYPE</u> | <u>DATA DESCRIPTION</u> |
|------------------------------|-----------------------|--------------------|---------------------------------------|
| Community | R | N | Unique Community ID Number i.e. FIPS, |

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| | | | |
|----------------|---|----|---|
| ID | | | GEOCODES, etc. |
| County Name | R | AN | County Name as given in FIPS 6-4 ¹ |
| County Code | R | N | FIPS County Code as given in FIPS 6-4 ¹ |
| PSAP ID | R | AN | Code identifying the PSAP as listed in the FCC PSAP registry http://www.fcc.gov/pshs/services/911-services/enhanced911/psapregistry.html |
| Agency ID | R | N | Emergency Service Agency ID |
| ESN | R | AN | Emergency Service Number associated with the ESZ |
| Source of Data | R | A | Agency that last updated the record |
| Date Updated | R | N | Date of last update Format: CCYY-MM-DD |

17.5.3 Municipal Boundary Layer (REQUIRED)

| <u>ATTRIBUTE NAME</u> | <u>USE R/O</u> | <u>TYPE</u> | <u>DATA DESCRIPTION</u> |
|------------------------------|-----------------------|--------------------|--|
| Community ID | R | N | Unique Community ID Number i.e. FIPS, GEOCODES, etc. |
| MSAG Community Name | R | A | Valid service community name as identified by the MSAG |
| Source of Data | R | A | Agency that last updated the record |
| Date Updated | R | N | Date of last update Format: CCYY-MM-DD |

17.5.4 Emergency Service Agency Boundary Layer (REQUIRED)

| <u>ATTRIBUTE NAME</u> | <u>USE R/O</u> | <u>TYPE</u> | <u>DATA DESCRIPTION</u> |
|----------------------------------|---------------------------|--------------------|---|
| PSAP ID | R | AN | Code identifying the PSAP as listed in the FCC PSAP registry http://www.fcc.gov/pshs/services/911-services/enhanced911/psapregistry.html |
| County Name | R | AN | County Name as given in FIPS 6-4 ¹ |
| Count Code | R | N | FIPS County Code as given in FIPS 6-4 ¹ |
| Agency ID | R | N | Emergency Service Agency ID |
| Source of Data | R | A | Agency that last updated the record |
| D | R | N | Date of last update Format: CCYY-MM-DD |

17.5.5 Cell Site Coverage Layer (REQUIRED)

| <u>ATTRIBUTE NAME</u> | <u>USE R/O</u> | <u>TYPE</u> | <u>DATA DESCRIPTION</u> |
|--------------------------------|--------------------|-------------|--|
| LDT Provider ID | R | AN | LDT Provider Identification Code. Codes to be developed and held by NENA |
| Numeric Cell ID | R | N | Carrier's Cell site ID |
| Cell Site Unique ID | R | AN | Cell Site Identifier provided by the wireless service provider, it is unique to the cell site |
| Numeric Sector ID | R | N | Carrier Sector ID usually indicates Omni or multi-sectored antenna faces |
| ESRD/ESRK | R | N | Emergency Service Routing Digit (ESRD) is a 10 digit # used for routing a wireless call & is assigned by cell sector. Emergency Services Routing Key (ESRK) is a 10-digit # for routing & is assigned as a pool of numbers to a PSAP. The first # of range is entered here |
| Sector Orientation/ Azimuth | R | N | Orientation of the cell sector antenna face, with North being 0 degrees and South = 180 degrees. |
| Sector Compass Orientation | R | A | Cell Sector Antenna orientation compass direction. An alpha indicator of the section directional – e.g. NE, WSW, etc. |
| Sector Beam Width | R | N | Width of the sector antenna beam in degrees, under normal operating conditions |
| Average Sector Radius | R | N | Average true sector radius range (under average operating conditions.) Radius at which cell tower's polygon of influence ends and another begins. |
| Coverage source | R | A | C=Company Map, D=Digital data from Company, P=GIS Propagation Study, L=Line of Site analysis, R=Range Defined |
| Source of Data | R | A | Agency that last updated the record |

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| | | | |
|--------------|---|---|--|
| Date updated | R | N | Date of last update Format: CCYY-MM-DD |
|--------------|---|---|--|

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17.5.6 Hydrology Polygon Layer (Optional)

| <u>ATTRIBUTE NAME</u> | <u>USE R/O</u> | <u>TYPE</u> | <u>DATA DESCRIPTION</u> |
|----------------------------------|---------------------------|--------------------|---|
| Surface Water Type | R | A | Type of Surface Water (pond, lake, large waterway, reservoir, etc.) |
| Surface Water Name | R | A | Name of Pond, lake, waterway, reservoir, etc. |
| Segment ID | R | N | Unique Hydrology Segment ID |
| Source of Data | R | A | Agency that last updated the record |
| Date Updated | R | N | Date of last update Format: CCYY-MM-DD |

18 NENA Recommended Classes of Service

| <u>Code</u> | <u>Name of Service</u> | <u>Commonly Used (4 char) CoS Codes</u> | <u>NENA Recom mended (4 char) CoS Codes</u> | <u>Related ATIS J- STD- 036-C-1 Position Source Codes</u> |
|-------------|--|---|---|---|
| 1 | Residence | RESD | RESD | |
| 2 | Business | BUSN | BUSN | |
| 3 | Residence PBX | PBXR | PBXR | |
| 4 | Business PBX | PBXB | PBXB | |
| 5 | Centrex | CNTX | CNTX | |
| 6 | Coin 1 Way | PAY\$, COIN | PAY\$ | |
| 7 | Coin 2 Way | COIN, PAY\$ | COIN | |
| 8 | Mobile | MOBL, WRLS | MOBL | |
| 9 | Residence OPX | RSDX, RESX | RSDX | |
| 0 | Business OPX | BSNX, BUSX | BSNX | |
| A | Customer Owned Coin Telephone | COCT | COCT | |
| B | COS Not Available | NA | NA | 48 |
| C | VoIP Residence | VRES | VRES | |
| D | VoIP Business | VBUS | VBUS | |
| E | VoIP Coin/Pay Phone | VPAY | VPAY | |
| F | Other Mobile | OMBL | OMBL | |
| G | Wireless Phase I | WRLS / WPH1 | WRLS | 49 |
| H | Wireless Phase II | WPH2 | WPH2 | 1-5, 8-47, 51 |
| I | Wireless Phase II with Phase I Information | P2P1, WPH1 | WPH1 | 0, 6, 7, 50 |

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| <u>Code</u> | <u>Name of Service</u> | <u>Commonly Used (4 char) CoS Codes</u> | <u>NENA Recom mended (4 char) CoS Codes</u> | <u>Related ATIS J- STD- 036-C-1 Position Source Codes</u> |
|--------------------|--|--|--|--|
| J | VoIP Nomadic | VNOM | VNOM | |
| K | VoIP Enterprise Services - Centrex & PBX | VENT | VENT | |
| L | Semi-Static, Small Coverage Cell | | * | 53 |
| M | Static Wireless Device | | * | 54 |
| N | Text Message Sent to 911 | TEXT | TEXT** | 52** |
| O | Wireless E911 Civic Address | | WCVC | 55 |
| P | Wireless E911 Dispatchable Location 1 | | WDL1 | 56 |
| Q | Wireless E911 Dispatchable Location 2 | | WDL2 | 57 |
| R | Supplemental Geodetic Location from Third-Party | | SDXY | *** |
| S | Available | | | |
| T | Telematics | TLMA, TELM | TLMA | |
| U | Available | | | |
| V | VoIP Services Default COS | VOIP | VOIP | |
| W | Available | WRLS | | |
| X | Available | CELL | | |
| Y | Available | | | |
| Z | Available | | | |



| <u>Code</u> | <u>Name of Service</u> | <u>Commonly Used (4 char) CoS Codes</u> | <u>NENA Recom- mended (4 char) CoS Codes</u> | <u>Related ATIS J- STD- 036-C-1 Position Source Codes</u> |
|-------------|------------------------|---|--|---|
| | | | | |

* Null, NENA has not adopted specific Classes of Service for position sources 53 (FIXD) and 54 (RESA) as recommended by ATIS, but they are still shown in this Exhibit for completeness, to reconcile with the ATIS document, and to avoid confusion. See 3.2.4 and 3.2.6 for discussion of FIXD and RESA classifications associated with position source 53 (FIXD) and position source 54 (RESA).

** This is applicable Short Message Service (SMS)/MMS text-to-911 origination.

*** ATIS has not adopted specific Position Source for Supplemental Geodetic Location from Third-Party.

19 NENA Recommended Service Descriptions for Customer Name/Service Field

| <u>Usual End State CoS</u> | <u>Recommended Service Description</u> | <u>Telecommunicator Clue Purpose</u> | <u>Primary Related ATIS J- STD- 036-C-1 Position Source Codes</u> | <u>Primary ALI</u> |
|--|--|--|---|--------------------|
| WPH2 | FEMTOCELL | Also pay attention to any presented <u>fixed</u> civic address information in addition to the x, y coordinates | 51 | x, y coordinates |
| WPH2 | INDOOR SMCELL/DAS HEAD | The civic address may be highly accurate because it should be a static device with a very small coverage area. Also pay attention to | 51 | x, y coordinates |

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| <u>Usual End State CoS</u> | <u>Recommended Service Description</u> | <u>Telecommunicator Clue Purpose</u> | <u>Primary Related ATIS J- STD- 036-C-1 Position Source Codes</u> | <u>Primary ALI</u> |
|---|---|--|--|---|
| | | any presented <u>fixed</u> civic address information in addition to the x, y coordinates | | |
| WPH2, VOIP*, OMBL, SDXY | WI-FI CALLING | This is believed to be a mobile handset, tablet, or other device using WI-FI connectivity, and disconnection may result if caller were to become mobile | Not Applicable | Either x, y coordinates or Civic Address, and such may vary by either certain circumstances or service provider |
| WDL2 | WRLS W/ CIVIC SPECIFIC | Also pay attention to presented x, y coordinates information in addition to the civic address. The caller is likely indoors, but may not have ability to be mobile (e.g., wireless broadband vs. Wi-Fi access point) | 57 | Civic Address |
| WDL1 | WRLS W/ CIVIC ZONE | Also pay attention to presented x, y coordinates information in addition to the civic address. The caller is likely indoors, but may not have ability to be mobile (e.g., wireless broadband vs. Wi-Fi access | 56 | Civic Address |

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| <u>Usual End State CoS</u> | <u>Recommended Service Description</u> | <u>Telecommunicator Clue Purpose</u> | <u>Primary Related ATIS J- STD- 036-C-1 Position Source Codes</u> | <u>Primary ALI</u> |
|---|---|--|--|--|
| | | point) | | |
| WCVC | WRLS W/ CIVIC RANGE | Also pay attention to presented x, y coordinates information in addition to the civic address. The caller is likely indoors, but may not have ability to be mobile (e.g., wireless broadband vs. Wi-Fi access point) | 55 | Civic Address |
| WPH2, VOIP* | NON-MOBILE PHONE | While caller may be using wireless network connectivity, this device is NOT believed to be a mobile handset, and disconnection may result if caller were to become mobile. | 51, 55, 56, or Not Applicable (VOIP) | (1) x, y coordinates when WPH2 is the CoS (2) Wireless Civic Address when either WDL2 or WDL1 is presented (3) VoIP Civic Address when a VOIP CoS is presented |

Where more than one of the above may apply, it is generally recommended that the one presenting the highest level quality of location information SHOULD be used in the event of a conflict. The above recommended Service Descriptions MAY be used alone or in

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combination with end user customer name or service provider name. Unnecessarily combining Service Descriptions or using non-standardized Service Descriptions can lessen usefulness and SHOULD be avoided. * In some areas, such as in Texas, the CoS of VOIP may be used as a default and VRES, VBUS, VNOM, etc. may generally be in use with Interconnected VoIP services.

20 NENA Registry System (NRS) Considerations

Not Applicable

21 Documentation Required for the Development of a NENA XML Schema

Not Applicable

22 Impacts, Considerations, Abbreviations, Terms, and Definitions

22.1 Operational Impacts Summary

Due to the increased volume and unique format of XML data, implementing the last changes to NENA 4 may impact many systems and network elements associated with the creation, transport and processing of 911 XML data.

Change to the NENA Reserved field should have no impact on operating systems since these character positions were reserved for NENA use and should be space filled where not being used.

22.2 Technical Impacts Summary

Communication Service Providers may need to adjust their existing processes, procedures, and services to implement data exchange format modifications and to conform to the data format requirements or suggestions in this document. However, data exchange formats are a longstanding part of E9-1-1, and any new modifications (such as adding new Classes of Service) have historically been accommodated as long as a sufficient period of time is available for development, deployment, and training associated with such.

22.3 Security Impacts Summary

Security is handled by the appropriate 9-1-1 Data Base Management System Provider and the appropriate 9-1-1 data providers as deemed by their internal IT security procedures and processes. The appropriate 9-1-1 Data Base Management System Provider should review and consider NENA-INF-015.1-2016 as applicable.

22.4 Recommendation for Additional Development Work

The evolution of 9-1-1 call and data delivery from analog to IP will require additional development to meet the needs of a Next Generation 9-1-1 system. New databases, processes, architecture, and interfaces will require this document be updated to accommodate these changes.

With regard to the additions of WDL2, WDL1, WCVL, TEXT, and SDXY, and changing existing VMBL to OMBL, it is recommended that there be additional development work by appropriate NENA Committee(s) to promptly incorporate WDL2, WDL1, WCVL, TEXT, SDXY, and OMBL into data mapping for purposes of Legacy Network Gateways, Legacy PSAP Gateways, and any other needed ALI to NG9-1-1 data purposes. See, specifically NENA-STA-010.2-2016 at Appendix A, Table A-15-2 Class of Service Mapping. In addition, new training information materials SHOULD be prepared for the CoS of WDL2, WDL1, WCVL, TEXT, SDXY, and OMBL.

With regard to the standardized use of "Service Descriptions" in the Customer Name/Service field, there are four recommendations for additional development work. First, the NENA Testing Validation Worksheet (TVW) process in NENA 57-002 (which has not be updated since 2006) SHOULD be reviewed and updated as needed to reflect use of "INDOOR SMCELL/DAS HEAD" in the Customer Name/Service field for provisioning small cells. Second, any existing uses of non-standardized "Service Descriptions" in the Customer Name/Service field SHOULD promptly be reviewed by the PSAP community. Any records found to be inconsistent with the new seven standardized "Service Descriptions" in Section 19 should have ALI Discrepancy Reports filed with the data provider. Fourth, within five years the new standardized "Service Descriptions" in the Customer Name/Service field SHOULD be reviewed for continued need and usefulness as NG9-1-1 becomes fully deployed on an end-to-end basis and a single legacy CoS is superseded and replaced by the use of (1) service environment, (2) service type, and (3) service mobility.

22.5 Anticipated Timeline

Deployment or implementation of this standard will take place as may be required or as done on a voluntary basis.

22.6 Costs Factors

The implementation of the XML portion of this standard may require programming changes to applications involved in the transport and processing of XML data and may require enhancements to the 911 network such as to support increased volumes of data.

22.7 Cost Recovery Considerations

Normal business practices may govern the cost recovery.

22.8 Additional Impacts (non-cost related)

The information or requirements contained in this NENA document are known to have impacts, based on the analysis of the authoring group, and development has been started. The primary impacts include:

- Improved coordination, communication, collaboration, and cooperation between 9-1-1 authorities, addressing authorities and other entities involved in 9-1-1 data development and data delivery will be needed

22.9 Abbreviations, Terms and Definitions

See NENA-ADM-000, NENA Master Glossary of 9-1-1 Terminology, located on the [NENA web site](#) for a complete listing of terms used in NENA documents. All abbreviations used in this document are listed below, along with any new or updated terms and definitions.

| Term or Abbreviation (Expansion) | Definition / Description |
|-------------------------------------|---|
| 9-1-1 SSP (System Service Provider) | <p>A 9-1-1 System Service Provider (9-1-1 SSP) provides systems and support necessary to enable 9-1-1 calling for one or more Public Safety Answering Points (PSAPs) in a specific geographic area. A 9-1-1 SSP may provide the systems and support for either E9-1-1 or NG9-1-1. In the context of E9-1-1, it is typically, but not always, an Incumbent Local Exchange Carrier (ILEC). This includes:</p> <ul style="list-style-type: none">• A method of interconnection for all telecommunications providers including but not limited to the wireline, wireless, and VoIP carriers• A method and mechanism for routing a 9-1-1 call to the Public Safety Answering Point (PSAP) with no degradation in service regardless of the technology used to originate the call• A method to provide accurate location information for an emergency caller to a PSAP and if required, to other emergency response agencies• Installation of PSAP call handling equipment |

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| | <p>and training of PSAP personnel when contracted to do so</p> <ul style="list-style-type: none"> • Coordinating with PSAP authorities and other telecommunications entities for troubleshooting and on issues involving contingency planning, disaster mitigation and recovery |
| ACN (Automatic Collision Notification) | A non-human initiated process to identify that a motor vehicle has been involved in a collision, collecting data from sensors in the vehicle, and communicating that data to a Call Center or PSAP. |
| AFLT (Advanced Forward Link Trilateration) | A type of handset-based position location technology. Unlike A-GPS, AFLT does not use GPS satellites to determine location. To determine location, the phone takes measurements of signals from nearby cellular base stations (towers) and reports the time/distance readings back to the network, which are then used to triangulate an approximate location of the handset. In general, at least three surrounding base stations are required to get an optimal position fix. |
| A-GPS (Assisted GPS) | Assisted GPS is a system that often significantly improves the startup performance—i.e., <u>time-to-first-fix</u> (TTFF)—of a <u>GPS</u> satellite-based positioning system. A-GPS is extensively used with GPS-capable <u>cellular phones</u> , as its development was accelerated by the U.S. <u>FCC's 911 requirement</u> to make cell phone location data available to emergency call dispatchers. |
| ALI (Automatic Location Identification) | The automatic display at the PSAP of the caller's telephone number, the address/location of the telephone and supplementary emergency services information of the location from which a call originates |

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| ALT # (Alternative Telephone Number) | Customer Number being remote call forwarded in Interim Number Portability service. |
| ANI (Automatic Number Identification) | Telephone number associated with the access line from which a call originates. |
| AOA (Angle of Arrival) | A terrestrial Location Determination Technology (LDT) that computes a transmitter's location based upon the angle at which the transmitter's radio signal strikes multiple receivers. |
| ASCII (American Standard Code for Information Interchange) | A standard for defining codes for information exchange between equipment produced by different manufacturers. A code that follows the American Standard Code for Information Interchange. |
| ATIS (Alliance for Telecommunications Industry Solutions) | A U.S.-based organization that is committed to rapidly developing and promoting technical and operations standards for the communications and related information technologies industry worldwide using a pragmatic, flexible and open approach. http://atis.org/ |
| Cell ID (Cellular Identification Number) | Identification number indicating a geographic region of cellular coverage. |
| CLDXF (Civic Location Data Exchange Format) | A set of data elements that describe detailed street address information. |
| CLLI (Common Language Location Indicator) | An identifier used in the North American telecommunications industry to specify the location of equipment. For example, an 8 to 11 character code assigned to a central office to designate the physical location. |
| CMRS (Commercial Mobile Radio Service) | A US FCC designation for any carrier or licensee whose wireless network is connected to the public switched telephone network. |
| COCT (Customer Owned Coin Telephone) | A designation in E9-1-1 that defines the service category of the telephony service for customer owned coin telephone. |
| CoS (Class of Service) | A designation in E9-1-1 that defines the service |

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| | category of the telephony service. A few examples are residential, business, Centrex, coin, PBX, VoIP and wireless Phase II (WPH2). NENA-INF-018 NENA Non-Mobile Wireless Service Interaction Information Document |
| CPE (Customer Premises Equipment) | Communications or terminal equipment located in the customer's facilities – Terminal equipment at a PSAP |
| CSDGM (Content Standard for Digital Geospatial Metadata) | National Spatial Data Infrastructure Stakeholders have long utilized the Content Standard for Digital Geospatial Metadata (CSDGM). However, <u>Circular A-119 Revised</u> directs agencies to use voluntary consensus standards in lieu of government-unique standards. Furthermore, <u>Circular A-16</u> promotes the use of international standards to advance the building of the <u>Global Spatial Data Infrastructure</u> (GSDI). Several ISO metadata standards are now endorsed by the Federal Geographic Data Committee (FGDC) and federal agencies and NSDI Stakeholders are encouraged to make the transition to ISO metadata. |
| DBMS (Data Base Management System) | A system of manual procedures and computer programs used to create, store and update the data required to provide Selective Routing and/or Automatic Location Identification for E9-1-1 systems. |
| E2 interface (Emergency Service Protocol E2 Interface) | An industry standard interface (defined in J-STD-036) used between a Mobile Positioning Center (MPC/GMLC) and an ALI database server. |
| EIA (Electronic Industry Association) | U.S. trade organization that issued its own standards and contributed to the American National Standards Institute. It also acted as a trade organization of manufacturers that set standards for use of its member companies, |

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| | conducted education programs, and lobbied in Washington for its members' collective prosperity. It was associated with the Telecommunications Industry Association (TIA). It ceased operations in February 2011. |
| ELIN (Emergency Location Identification Number) | A valid North American Numbering Plan format telephone number, assigned to the MLTS Operator by the appropriate authority that is used to route the call to a PSAP and is used to retrieve the ALI for the PSAP. The ELIN may be the same number as the ANI. The North American Numbering Plan number may in some cases not be a dialable number. |
| E-OTD (Enhanced Observed Time Difference) | Enhanced Observed Time Difference (E-OTD) is a standard for the location of mobile telephones. The location method works by multilateration. Conceptually, the handset makes an observation of the time difference of arrival of signals from two different base stations. |
| ERL (Emergency Response Location) | A Location to which a 9-1-1 emergency response team may be dispatched. The location SHOULD be specific enough to provide a reasonable opportunity for the emergency response team to quickly locate a caller anywhere within it. |
| ESN (Emergency Service Number) | A 3-5 digit number that represents one or more ESZs. An ESN is defined as one of two types: Administrative ESN and Routing ESN |
| ESRD (Emergency Services Routing Digit) | A 10-digit North American Numbering Plan number that uniquely identifies a base station, cell site, or sector that is used to route wireless emergency calls through the network. The ESRD may also be used by the PSAP to retrieve the associated ALI data. |
| ESRK (Emergency Services Routing) | A 10-digit North American Numbering Plan number that uniquely identifies a wireless |

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| Key) | emergency call, is used to route the call through the network, and used to retrieve the associated ALI data. |
| FCC (Federal Communications Commission) | An independent U.S. government agency overseen by Congress, the Federal Communications Commission regulates interstate and international communications by radio, television, wire, satellite and cable in all 50 states, the District of Columbia and U.S. territories. |
| FCC PSAP registry (also known as the Master PSAP Registry) | The Registry lists PSAPs by an FCC assigned identification number, PSAP Name, State, County, City, and provides information on any type of record change and the reason for updating the record. The Commission updates the Registry periodically as it receives additional information. Available at http://www.fcc.gov/pshs/services/911-services/enhanced911/psapregistry.html |
| FGDC (Federal Geographic Data Committee) | The Federal Geographic Data Committee (FGDC) is an interagency committee that promotes the coordinated development, use, sharing, and dissemination of geospatial data on a national basis. https://www.fgdc.gov/ |
| FIPS (Federal Information Processing Standards) | Federal Information Processing Standards (FIPS) are publicly announced standards developed by the United States federal government for use in computer systems by non-military government agencies and government contractors. Refer to FIPS in Wikipedia for overall information |
| FOC (Function of Change) | An identifier to indicate the type of activity and/or type of processing that the data record is being submitted for. |
| FX (Foreign Exchange Service) | A telephone line switched in an exchange or central office other than the exchange or central office area in which the telephone is |

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| | located. |
| GIS (Geographic Information System) | A system for capturing, storing, displaying, analyzing and managing data and associated attributes which are spatially referenced. |
| GPS (Global Positioning System) | The Global Positioning System (GPS) is a space-based navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. https://en.wikipedia.org/wiki/Global_Positioning_System |
| HPMS (Highway Performance Monitoring System) | The Highway Performance Monitoring System (HPMS) is a national level highway information system that includes data on the extent, condition, performance, use and operating characteristics of the nation's highways. |
| HTTP (Hypertext Transfer Protocol) | Hypertext Transport Protocol typically used between a web client and a web server that transports HTML and/or XML. |
| HTTPS (Hypertext Transfer Protocol Secure) | HTTP with secure transport (Transport Layer Security or its predecessor, Secure Sockets Layer) |
| i2 | An architecture to connect emergency callers in the IP domain with Public Safety Answering Points (PSAPs) supported by the existing E9-1-1 network infrastructure. This interim step in the migration towards end-to-end IP networks is referred to as i2. |
| i3 | NENA i3 introduces the concept of an Emergency Services IP network (ESInet), which is designed as an IP-based inter-network (network of networks) shared by all agencies which may be involved in any emergency. |
| IPBX or IP PBX (Internet Protocol Private Branch Exchange) | An IP PBX is a private branch exchange (telephone switching system within an enterprise) that switches calls between VoIP |

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| | (Voice over Internet Protocol or IP) users on local lines while allowing all users to share a certain number of external phone lines. The typical IP PBX can also switch calls between a VoIP user and a traditional telephone user, or between two traditional telephone users in the same way that a conventional PBX does. The abbreviation may appear in various texts as IP-PBX, IP/PBX, or IPPBX. |
| IPR (Intellectual Property Rights) | Includes patents, published and unpublished patent applications, copyrights, trademarks, and trade secret rights, as well as any intellectual property right resembling a member of the foregoing list as such right may exist in a particular jurisdiction. www.nena.org/IPR |
| ISO (International Standards Organization) | An independent, non-governmental international organization with a membership of 161 national standards bodies. https://www.iso.org |
| LDT (Location Determination Technology) | A system which computes the x and y coordinates of a wireless 9-1-1 caller, and z, where applicable. |
| LNP (Local Number Portability) | A process by which a telephone number may be reassigned from one Local Exchange Carrier to another |
| MLTS (Multi-Line Telephone System) | A system comprised of common control unit(s), telephone sets, control hardware and software and adjunct systems used to support the capabilities outlined herein. This includes network and premises based systems. E.g., Centrex, VoIP, as well as PBX, Hybrid, and Key Telephone Systems (as classified by the FCC under Part 68 Requirements) and includes systems owned or leased by governmental agencies and non-profit entities, as well as for profit businesses. |
| MMS (Multimedia Messaging) | Multimedia Messaging Service (MMS) is an |

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| Service) | evolution of the SMS. With a MMS, you can send a message including pictures, video, or audio content to another device. With a MMS, you can send a message including pictures, video, or audio content to another device. |
| MSAG (Master Street Address Guide) | A database of street names and house number ranges within their associated communities defining Emergency Service Zones (ESZs) and their associated Emergency Service Numbers (ESNs) to enable proper routing of 9-1-1 calls. |
| NAD83 (North American Datum 83) | A geographic coordinate system, based on modern satellite measurements of the shape of the earth, used to represent spatial features on a flat map display. |
| NEAD (National Emergency Address Database) | The National Emergency Address Database (NEAD) is defined by the Federal Communications Commission (FCC) in 47 C.F.R. 20.18(i)(1) as "[a] database that utilizes MAC address information to identify a dispatchable location for nearby wireless devices within the CMRS provider's coverage footprint." That same FCC rule also defines dispatchable location as "[a] location delivered to the <u>PSAP</u> by the <u>CMRS</u> provider with a 911 call that consists of the street address of the calling party, plus additional information such as suite, apartment or similar information necessary to adequately identify the location of the calling party. The street address of the calling party must be validated and, to the extent possible, corroborated against other location information prior to delivery of dispatchable location information by the <u>CMRS</u> provider to the <u>PSAP</u> ." |
| NENA (National Emergency Number Association) | The National Emergency Number Association is a not-for-profit corporation established in 1982 to further the goal of "One Nation-One Number." NENA is a networking source and promotes research, planning and training. NENA |

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| | strives to educate, set standards and provide certification programs, legislative representation and technical assistance for implementing and managing 9-1-1 systems. www.nena.org |
| NL (New Line) character | The NEW LINE character is a single character that identifies the end of record in all cases for all records. (ASCII HEX-0A) |
| NPA (Numbering Plan Area) | An established three-digit area code for a particular calling area where the first position is any number 2 through 9 and the last two (2) positions are 0 through 9. |
| OPX (Off-Premises Extension) | An Off-Premises Extension (OPX) is a dedicated circuit connecting a distant location to a main PBX to provide the same phone system features available at the main location. |
| OTT (over-the-top) | Over-the-top (OTT) services that bypass traditional network distribution approaches and run over, or on top of, core Internet networks. |
| pANI (Pseudo Automatic Number Identification) AKA: routing number | A telephone number used to support routing of wireless 9-1-1 calls. It may identify a wireless cell, cell sector or PSAP to which the call should be routed. |
| PBX (Private Branch Exchange) | A private telephone switch that is connected to the Public Switched Telephone Network. |
| PSALI (Private Switch ALI) | A service option which provides Enhanced 9-1-1 features for telephone stations behind private switches. E.g. PBXs. |
| PSAP (Public Safety Answering Point) | An entity responsible for receiving 9-1-1 calls and processing those calls according to a specific operational policy. <ul style="list-style-type: none"> • Primary PSAP: A PSAP to which 9-1-1 calls are routed directly from the 9-1-1 Control Office. • Secondary PSAP: A PSAP to which 9-1-1 calls |

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| | <p>are transferred from a Primary PSAP.</p> <ul style="list-style-type: none"> • Alternate PSAP: A PSAP designated to receive calls when the primary PSAP is unable to do so. • Consolidated PSAP: A facility where multiple Public Safety Agencies choose to operate as a single 9-1-1 entity. • Legacy PSAP: A PSAP that cannot process calls received via i3-defined call interfaces (IPbased calls) and still requires the use of CAMA or ISDN trunk technology for delivery of 9-1-1 emergency calls. • Serving PSAP: The PSAP to which a call would normally be routed. |
| PSAP ID | <p>"PSAP ID" sometimes be used to mean "the Code identifying the PSAP associated with the assigned ESN," but may also sometimes be used to mean the Code identifying the PSAP as listed in the FCC PSAP registry.</p> |
| RF Fingerprinting | <p>Radio frequency fingerprinting is a process that identifies the device or signaler from which a radio transmission originated by looking at the properties of its transmission, including specific radio frequencies. Each signal originator has its own specific "fingerprint" based on the location and configuration of its transmitted signals.</p> |
| RR | Railroad |
| RTT (Real-Time Text) | <p>Text transmission that is character at a time, as in TTY.</p> |
| SGML (Standard Generalized Markup Language) | <p>The Standard Generalized Markup Language (SGML) is a standard for defining generalized markup languages for documents.</p> |
| SMS (Short Message Service) | <p>A service typically provided by mobile carriers that sends short (160 characters or fewer) messages to an endpoint. SMS is often fast, but is not real time.</p> |

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| SOAP (Simple Object Access Protocol) | SOAP is a protocol for exchanging XML-based messages over a computer network, normally using HTTP. SOAP forms the foundation layer of the Web services stack, providing a basic messaging framework that more abstract layers can build on. |
| STX/ETX (Start of Text /End of Text) | STX/ETX is a simple packet protocol for serial data streams and offers packetization, type tagging, and checksum protection for user data. |
| TAR (Taxing Area Rate) Code | A Taxing Area Rate (TAR) Code is an abbreviation that may sometimes be used in a legacy service order system and that may identify a taxing area. |
| TCP/IP (Transmission Control Protocol/Internet Protocol) | A communications protocol linking different computer platforms across networks. TCP/IP functions at the 3rd and 4th levels of the Open Systems Interconnection model. |
| TDOA (Time Difference of Arrival) | A terrestrial Location Determination Technology (LDT) that computes a transmitter's location based upon the times a signal is received at multiple receivers. |
| TIA (Telecommunications Industry Association) | A lobbying and trade association, the result of the merger of the USTA (United States Telephone Association) and the EIA (Electronic Industries Association). |
| TN (Telephone Number) | Telephone Number |
| TOA (Time of Arrival) | Time of arrival (TOA or ToA), sometimes called <u>time of flight</u> (ToF), is the travel time of a radio signal from a single transmitter to a remote single receiver. |
| TTY (Teletypewriter) A.K.A. TDD (Telecommunications Device for the Deaf) | The phrase TTY (or Teletype device) is how the deaf community used to refer to the extremely large machines they used to type messages back and forth over the phone lines. A TDD operates in a similar way, but is a much smaller desktop machine. The deaf community has |

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| | used the phrase "TTY" and sometimes uses it interchangeably with "TDD." http://www.gallaudet.edu/dpn-home/ttyrelays-and-closed-captions.html |
| TVW (Testing Validation Worksheet) | This worksheet and the accompanying completion rules ensure that PSAPs or the 9-1-1 Governing Authority have all of the data elements they need in order to make informed call routing decisions and to update their CAD and mapping applications. |
| URL (Uniform Resource Locator) | A URL is a type of URI, specifically used for describing and navigating to a resource (e.g., http://www.nena.org) |
| USDOT | United States Department of Transportation (USDOT) |
| USPS (United States Postal Service) | United States Postal Service |
| UTC (Universal Coordinated Time) | The primary time standard in the world based on the time zone in Greenwich, England. Also known as Zulu or Greenwich Mean Time (GMT). Time provided by National Institute of Standards and Technology (NIST) and United States Naval Observatory (USNO). |
| VoIP (Voice over Internet Protocol) | Technology that permits delivery of voice calls and other real-time multimedia sessions over IP networks. |
| W3C (World Wide Web Consortium) | World Wide Web Consortium (W3C) |
| WGS 84 (World Geodetic System for 1984) | The World Geodetic System reference coordinate system used by the Global Positioning Systems and in cartography and navigation. |
| Wi-Fi | A wireless networking technology that uses radio waves to provide wireless high-speed internet and network connections. Wi-Fi is a |

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| | registered trademark phrase that means IEEE 802.11x |
| Wi-Fi Calling | A service offering being used by some wireless carriers, cable companies, other companies, and some enterprise customers that seek to deliver voice calls over Wi-Fi. In the context of 9-1-1 calling at least from major wireless carriers, there is a general first preference for the mobile handset to send 9-1-1 calls over the CMRS or VoLTE networks where available and Wi-Fi calling may only be used when such does not occur within a period of several seconds. Where the 9-1-1 calling is done via Wi-Fi calling, the connectivity from the Wi-Fi access point to the 9-1-1 system is comparable to connectivity from a wired broadband connection for VoIP to the 9-1-1 system. |
| WHP (Wireless Home Phone) | A residential or business Digital Enhanced Cordless Telephone (DECT) phone adapter device that generally provides home phone calling through wireless Commercial Mobile Radio Service connected services; generally requires an AC power source; is generally not used in a mobile context (as is a wireless handset); and is designed for use at a fixed location. This device may support nomadic as well as static use cases. It is also technically possible for this device to be used in a mobile manner where a mobile AC power source is also available, such as in a motor home. |
| WSDL (Web Service Description Language) | The Web Services Description Language (WSDL) is an XML-based language used to describe the services a business offers and to provide a way for individuals and other businesses to access those services electronically. WSDL is the cornerstone of the Universal Description, Discovery, and Integration (UDDI) initiative spearheaded by |

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| | Microsoft, IBM, and ARIBA. UDDI is an XML-based registry for businesses worldwide, which enables businesses to list themselves and their services on the Internet. WSDL is the language used to do this. WSDL is derived from Microsoft's Simple Object Access Protocol (SOAP) and IBM's Network Accessible Service Specification Language (NASSL). WSDL replaces both NASSL and SOAP as the means of expressing business services in the UDDI registry. An XML-based interface definition language that is used for describing the functionality offered by a web service. |
| X Coordinate (Longitude) | Longitude coordinate. |
| XML (eXtensible Markup Language) | An internet specification for web documents that enables tags to be used that provide functionality beyond that in Hyper Text Markup Language (HTML). In contrast to HTML, XML has the ability to allow information of indeterminate length to be transmitted to a PSAP call taker or dispatcher versus the current restriction that requires information to fit the parameters of predefined fields. |
| XML (eXtensible Markup Language) Schema | The formal document definition (structure, content type and constraints) describing a class of XML instance documents. There are various XML schema languages, but in this document, all schemas are assumed to be defined using the W3C XML Schema definition language. |
| Y Coordinate (Latitude) | Latitude coordinate. |
| Z Coordinate (Elevation) | Elevation/Altitude indicated as height different from mean sea level (plus or minus), measured in meters. (This is not intended to include floor level or uncompensated barometric pressure.) |

23 Recommended Reading and References

- [1] NENA Master Glossary of 9 1 1 Terminology, [NENA-ADM-000](#)
- [2] U.S. Department of Transportation - Federal Railroad Administration– [Secretary's Action Plan](#) for Highway-Rail Crossing Safety and Trespass Prevention Secretary of Transportation
- [3] NENA Data Standards For Local Exchange Carriers, ALI Service Providers & 9-1-1 Jurisdictions, [NENA-STA-030](#) (originally 02-011)
- [4] NENA GIS Data Collection and Maintenance Standards, [NENA-STA-032](#) (originally 02-014)
- [5] Wireless Phase I & II Features and Functions Operational Information Document, [NENA 57-001](#)
- [6] Refer to NENA ALI Query Service Standard for specifications on XML ALI source data exchange, [NENA-STA-029](#) (originally 04-005)

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